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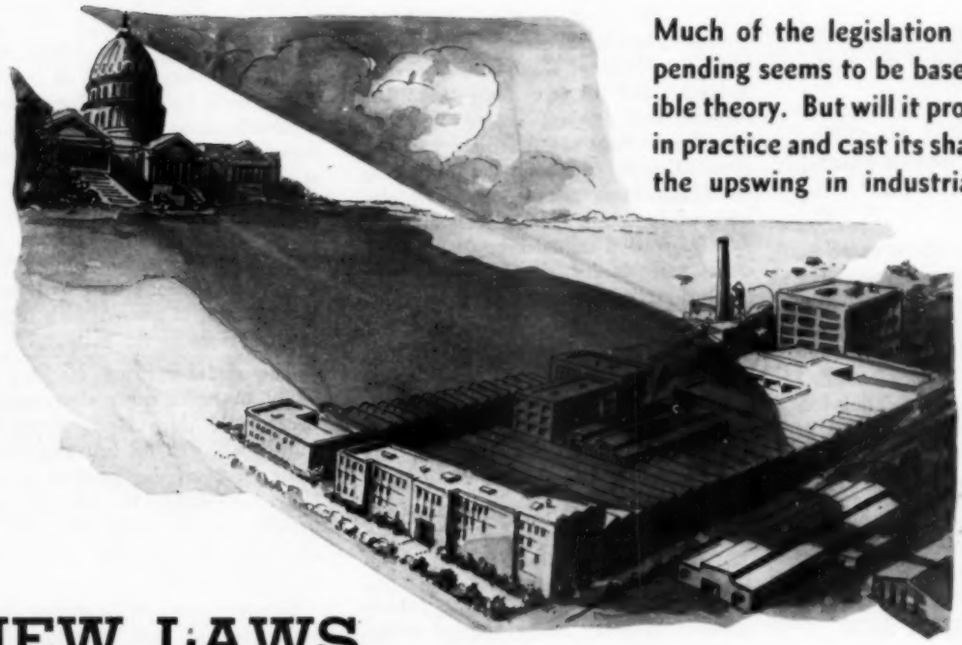


Much of the legislation passed and pending seems to be based on plausible theory. But will it prove unsound in practice and cast its shadow across the upswing in industrial activity?

NEW LAWS

WILL THEY HELP or HINDER?

K. H. CONDIT
Editor

MUCH ill-considered legislation went through the past session of Congress almost by default because so many of those concerned shirked their duty and paid no attention whatever to what a clever political-pressure group was doing. Many Congressmen voted as they did because they heard clearly only one side of the case for the enormously complicated bills handed to them by New Deal draftsmen.

Only a few weeks remain before another session begins. Some of the bills that failed will certainly come up again; hundreds of new ones will be proposed. The business future of the metal-working industry will be involved in the decisions made. At its last session, Congress proved conclusively that its actions can affect vitally the operations of the metal-working industry. Full understanding of the bills made into law at that session must form the basis for intelligent and effective opposition to further uneconomic law-making in the next.

First in importance of the mass of legislation enacted without adequate study is the Social Security Act. Few men have had the courage to criticise it very sharply because it is an effort to do something for humanity. Most people are more likely to acclaim the spirit behind such a social experiment as this one than they are to look critically at the machinery set up to accomplish the object. If this were not the case the Social Security Act would most certainly have encountered more resistance than it did. There is grave question not only as to its constitutionality but also as to whether it will do what it is intended to do.

Consider these questions: Is it safe to put into the hands of politics such astronomic sums as the old age pension and unemployment insurance funds will be thirty years hence? Is it possible to handle such sums with the requisite safety? Can business management be improved to the point where business can stand the extra tax, which is more than a large proportion of businesses earn today? Are old age pensions and unemployment insurance federal or state responsibilities? Answer them and you will know whether you believe this law is sound.

Even if it is workable how is it going to affect this industry? One of the first things that is likely to happen is a slowing down of individual effort. How many of us will struggle to improve our present situation and economize so that our future is reasonably secure if we know that we will get a pension from the government when we reach 65? Not too many. Most

WAGNER-CONNERY LABOR DISPUTES ACT

- **Establishes a permanent National Labor Relations Board with power to examine actions and records of employers that might interfere with collective bargaining and to enforce its findings through the courts if necessary.**
- **Board has no power to control actions of strikers no matter how violent.**
- **One aim is to kill all company unions and works councils.**

of us have to be spurred to exertion, particularly if the exertion involves the gray matter.

When this slowing down becomes noticeable management will probably move to counteract it by installing more productive machinery. That will help those of us who are engaged in building that kind of machinery.

The pensions provided are so small that they are likely to prove bitterly disappointing to the recipients, particularly to those who become eligible during periods of inflation when the buying power of thirty dollars a month is small. The obvious answer to this objection is pressure on Congress and a revision of the law to increase the benefits. Our experience with war pensions is sufficient proof that this will happen.

Private pension systems are not provided for in the law as passed, but a Congressional committee is studying the matter.

SOCIAL SECURITY ACT

- **Grants certain sums to states, having approved old age pension and unemployment insurance laws, and having approved plans for aid to dependent children and for maternal and child health services.**
- **Establishes federal system of contributory old age benefits beginning at age 65.**
- **Taxes wages 1 per cent in 1937, 1938 and 1939, and ½ per cent more each 3 year period until 1949 when 3 per cent maximum is reached.**
- **Taxes employers corresponding amounts.**
- **Also taxes employers 1 per cent of total wages in 1936, 2 per cent in 1937, 3 per cent thereafter to establish unemployment insurance fund.**
- **Sets up board to administer the act.**

The Administration was all set to have the National Industrial Recovery Act extended for two years when the famous "sick chicken" crossed its path. Dire forebodings of immediate business demoralization following the folding up of NIRA have proved to be totally without foundation. Congress and the Administration milled around for some days and finally developed a joint resolution that continues a few of the NRA functions and has led to a sort of trade agreement under the combined auspices of NRA and the Federal Trade Commission. The first of these voluntary codes has just been granted to the wholesale tobacco interests, and one has been applied for by the retail automobile merchants.

Unwanted Codes

Most of the groups in the metal-working industry never wanted codes, and they knew instinctively that Section 7a would work the havoc it did with ripening industrial relations of a satisfactory nature. It will be many years before we recover from the harm done by the false philosophers who preached the conflict of interest between employer and employee. As for the emasculated NRA it still has some capacity for mischief in its work of tabulating violations of the old codes. It will be as well for managers and owners to bear this activity in mind when they find it necessary to adjust hours.

The President's instructions to Congress to pass the Guffey Coal Bill regardless of its probable unconstitutionality constitute a precedent in executive irresponsibility. This measure may possibly bring order out of the chaos of a very disordered industry but it is certainly a most unwelcome precedent for healthy industries to contemplate.

Much to the surprise of everyone concerned Mr. Roosevelt's "soak-the-rich" tax bill, sent over to the Capitol after an earlier promise that no tax legislation would be asked for, almost became a sound taxation measure. The senators who would have revised it to make it a true revenue producing measure instead of a demagogic vote getter showed that they knew what will be necessary sooner or later if we are ever to balance the national budget. They also showed many people who never filled out an income tax blank that they are going to be familiar with that nuisance before long. Under the exemptions proposed in this revision every toolmaker and a good many machinists would have paid an income tax in 1936. The amounts would have been small, it is true, but they would have been large enough to arouse in those who paid them a much keener interest in how Washington spent their money.

It didn't take the Administration politicians long, however, to squelch this threat to party popularity. The original provisions were put back into the bill and it passed with only slight modifications in the rates.

The metal-working industry is unlikely to suffer more than any others because of this utterly unsound law, but it will get its full share of grief. Look first at the graduated corporation tax—12½ to 15 per cent—a penalty on size and efficiency, whichever may be responsible for more than a modest profit.

If you happen to be one of the many thousands in high and low positions in the metal-working industry who own a few shares of General Motors or General Electric your dividends are reduced by a larger tax on corporation income than is levied on a small corporation entirely owned by one man or one family. That man's income may be a hundred times yours but because his company makes a lesser profit—even though the proportion of profit to investment may be much larger—than the one of which you hold stock he gets away with a smaller tax. Doesn't sound exactly fair, does it?

Taxes Hit Us All

But what if you don't own shares in anything but yourself? Just this—wages or salaries paid by a company that is just breaking even or barely making its interest charges seldom compare with what a profitable enterprise can and will pay. It should be obvious that any tax measure that injures a company or a corporation affects in like manner the fortunes of the employees of that organization. That's why everyone of us is vitally interested in taxes whether they hit us directly or not.

A further danger for the average man

in this tax law lies in its power to wreck a corporation owned by one man or one family. Liquidation of enough of the assets to meet confiscatory estate taxes is almost sure to throw the enterprise into bankruptcy or a merger. Those of us who have been through either of these wringers know to their sorrow what happens to jobs, salaries and even wages. Why should we be threatened by such a fate?

To End Labor Disputes

So far little has been heard of the Wagner-Connery Labor Disputes Act, perhaps because the members of the Board authorized by it were not appointed until nearly the first of September. This law guarantees labor the much discussed right to bargain collectively. It professes to seek the lessening of industrial strife but unless it is most intelligently administered will have exactly the opposite effect because its framers began with the premise that the interests of employer and employee are inherently antagonistic. Thus it is essentially an amplification of the late unlamented Section 7a of NIRA. Among its objectives is the suppression of any form of company union or works council, regardless of the wishes of the employees.

The board set up by this act can act as investigator, prosecutor and judge of any acts by employers that might be construed as opposing the freedom of employees to organize, but it has no power to constrain illegal or unreasonable actions of labor unions or other employee organizations. Its edicts are enforceable by a United States District Court and its opportunities for mischief are unbounded. What the Supreme Court will say about it if it tackles an intrastate commerce case, the Schechter decision shows clearly enough.

A more constructive tone marks the laws extending the Reconstruction Finance Corporation for two years and amending the Federal Housing Act to include machinery and other commercial modernization insured loans up to $50,000. Both of these acts have done considerable good. More than a few metal-working plants have been saved from closing by an RFC working capital loan, and a very few have taken advantage of the FHA provisions. It is likely that many more loans would have been made through both agencies if the potential borrowers had remembered that neither one was invented by the New Deal. RFC was set up during the Hoover administration, the FHA idea was devised by Eugene Meyer, Ogden Mills and George Houston in 1931 but was not pushed because of the banking troubles. The net result has been, however, that neither agency has done anywhere near as much good as it might have done.

One other measure that passed as a public resolution may have some effect on metal-working. It is the Neutrality Resolution under the terms of which the President has just banned the selling of arms and munitions to Italy or Ethiopia. Since most of the weapons of modern warfare originate in the machine shop this resolution is likely to prevent a recurrence of the busy days of 1914-16 which brought fortune to some. Even under present conditions I doubt if there are any men in the metal-working industry who would seek that kind of prosperity.

Much of the legislation passed by the last Congress will have to run the gantlet of Supreme Court analysis. Little of it seems likely to survive. Hence the talk of amendments to give the federal government control over all commerce and industry. Since the metal-working industry is essentially an industry developed by individual initiative and ingenuity, all those connected with it owe it to themselves and to their craft to make sure they understand the implications of federal control of industry and trade. They have an arresting example in the present condition of the railroads.

Bills That Failed

Of the bills that failed to pass and that will surely be considered in the next session several are worth mentioning. The Walsh bill to fasten the restrictions of NIRA on all those seeking government contracts barely failed of passage. Unless its wording and intent is changed it will result in reestablishment of NIRA by what is little more than subterfuge. In other words it will restore rigid standards of hours and wages. There may be some branches of the metal-working industry where such standards are not a hardship but by far the greater portion of the industry must be flexible to expand when called upon, to contract when the need has passed.

Another attempt to secure the same kind of rigidity through government control failed when Senator O'Mahoney's bill to establish federal licensing of all trade and industry got stuck in committee. It is sponsored by the American Federation of Labor and is still before the Senate Committee on Interstate Commerce.

TAXATION
(Public Law No. 407)

- **Levies corporation income tax graduated from 12½ to 15 per cent.**
- **Increases capital stock levy from $1 to $1.40 per thousand.**
- **Taxes excess profits at 6 per cent on profits between 6 and 15 per cent, 12 per cent on profits above 15 per cent of declared value.**
- **Levies new tax on inter-corporate dividends.**
- **Sets confiscatory rates on large estates.**

Still a third attempt to accomplish much the same result came to naught when the Black 30-Hour bill and the corresponding Connery substitute remained on the calendar. Those who believe that there is only a limited amount of work to be found, and that that limited amount must be divided up as evenly as may be among the working population will certainly push it forward again in the next session.

Several other bills of more or less interest to the industry went over and will be considered by the next session. They will all bear watching. Men in this industry must remember that they are no different from any other citizens. Ignorance of the law is no defense. Likewise, ignorance of what is proposed in Congress is no excuse for failure to make yourself heard before it is too late.

WALSH BILL

- **Provided that contracts made to supply articles, materials or services to any government agency must contain agreements that code wages had been paid and code hours observed by the principal contractor, and that principal contractor must get like assurance of observance from subcontractors.**
- **Same stipulation made to cover any work done under government loan.**
- **Penalties for infraction provided.**

DECENTRALIZATION CUT OUR COSTS

Carefully planned shop layouts in machining and assembly departments resulted in better products, reduced operating and handling time, and improved supervision

W. S. OSWALD

Superintendent, Nuttall Works
Westinghouse Electric & Mfg. Company

IN THE early part of 1934, the trend of business was such that a rearrangement and completely revised plant layout were necessary at the Nuttall plant of the Westinghouse Electric and Manufacturing Company. The business is made up of two classes, one highly diversified and the other standard. A complete analysis of the entire organization structure and manufacturing set-up was made. This analysis covered all machine tools, usefulness of these tools, for the type of business available at that time; also their adaptability to the business foreseen in the future.

A great deal of time and effort was taken to make a layout and to place machine tool equipment so that it would be available for machining operations on both standard and diversified products, and so arranged as to allow for the least amount of material handling from one machine to the next.

After the study was completed, it was found desirable to shrink activities to a more concentrated area. In planning this shrinkage, it was decided to set up various departments, with respect to products manufactured rather than to specific operations. This proved to be well founded, as the efficiency attained was most satisfactory. To realize this increased efficiency adequate storage was provided for raw material and for all finished parts.

Another consideration is handling facilities for operators on the various machine tools. Often an operator is using the correct set-up, proper tooling and recommended feeds and speeds, but wastes considerable time through poor handling facilities. This not only penalizes the cost of the job with high handling time but also fails to obtain full use of the machine tools involved on the various operations.

Repeatedly new equipment is thought necessary because of peak loads on some specific machine tool. In numerous cases thorough analysis has brought out that production on these machines can be increased as much as 30 per cent by reduction of lost time. This may be accomplished by the use of job cranes, electric hoists, rearrangement of machine tools, changes in design where possible to allow for change in method of machining. In some cases it is possible to reduce assembly time greatly.

There is also a decided advantage in concentration by product in that the foreman and supervisory staff become better acquainted with all operations pertaining to the particular apparatus in each department.

Defective work has taken a decided drop since we started using the present set-up. This is caused principally by operations being laid out to expedite complete machining of the product. Where any question may come up, a "take-a-chance" method is no longer used on machining operations. With the work concentrated, the correct procedure is quickly determined.

Fig. 1—Proper arrangement of machines devoted to large work eliminates back tracking, excess handling and waiting between operations

Fig. 2—In this circular assembly set-up, each man is responsible for completing an entire unit

An illustration of a machining department as grouped by product on large gear work, is shown in Fig. 1. In this group, castings are received at one end of the department and follow through turning and boring, keyseating and hobbing operations and then move to the inspector, who tests the finished product for runout, backlash and grade of workmanship before final shipment to stock or the assembly department.

With this layout, the output of the department has increased appreciably by the elimination of waiting between operations, while handling expense has decreased.

On assembly operations the same reasoning applies. In setting up an assembly department for diversified products, it is essential to make the lineup flexible and to obtain a high point of efficiency. A flexible assembly layout is shown in Fig. 2; it consists of a circle with stands for building ten units. Each stand is located on the outside of the circle with a hoist, located in the center of the ring, reaching each work station.

Also in the center is a cleaning tank, adjacent to the work stations requiring this operation. The oil heating bath for shrinking on bearings, spacers, etc., is next to the work station of the first operation. Oil is maintained at a given temperature by the use of electric heaters, thermostatically controlled. Materials used in this assembly are kept in racks handy to the operators using them.

This type of assembly, while departing from the conventional straight line set-up, has decided advantages for diversified production. Each individual in this circle is responsible for the complete assembly of all units assigned to him. Material saving in assembly cost and a substantial reduction in defective work has been brought about by better assembly methods, better lighting and better handling facilities.

Benefits derived from this particular set-up, in addition to lower cost and fewer defects, are a much better product, because individual operators can be more readily trained than when they were working on specific operations; and lightening of supervision, because a more efficient working force has been obtained. Approximately double the orders for this type of apparatus have been taken that would have been possible under the former assembly set-up.

The new layout has greatly reduced paper work. For instance, routing the job through the various manufacturing operations is simplified, inasmuch as all the operations on a given item are performed under one supervisor. Production follow-up has been decreased, because the production clerk no longer contacts half a dozen foremen for delivery, but can see one for all manufacturing operations on a particular item.

Costing, payroll and timekeeping are also simplified. Less paper work and fewer calculations are necessary in combining these operations into one department.

To obtain the advantages mentioned it must be borne in mind that a complete study by the cost analysis and plant layout group on any major change is not sufficient. It is their duty to plan and make layouts, but before proceeding with any such plan, it is necessary that all interested parties in the manufacturing department be given an opportunity to express their views and offer any suggestions they may have in mind.

STAMPINGS MODERNIZE THE BICYCLE

As products of the power press, frame connections constitute a distinct improvement in production and appearance over their drop-forged antecedents

FRED B. JACOBS

DURING the Gay Nineties, when a high-grade bicycle cost $100, the frame connections were made from drop forgings bored and reamed to size in turret lathes. This was a lengthy and expensive process, and the joints formed between the forgings and frame tubes were not always rigid enough to withstand hard usage. During the past 40 years steady evolution in bicycle manufacture has caused metal stampings to take the place of drop forgings, resulting in greater strength and better appearance.

A comparison of the drop-forged and the stamped-metal connections is given in Fig. 1. As shown at *A* the projections for the lower frame tube, the seat mast and the two rear fork tubes of the drop-forged crank-hanger cluster are not flush with the tubular members. The tubes were pushed in place, pinned and brazed. In rare instances, the joints were reinforced with steel ferrules. At *B* is shown the modern construction wherein all joints are flush. This hanger cluster is built up from metal stampings, and the same method is followed today for other frame units such as the head, seat mast and cluster.

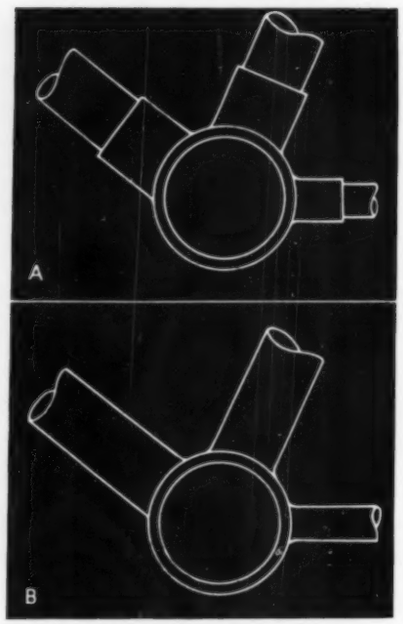


Fig. 1—In the early days of the bicycle, connections were not flush with the frame tubing

No two bicycle manufacturers follow exactly the same steps in making frame connections, but the sequence of operations described is representative of modern practice at the plant of the Shelby Cycle Company. This company operates its own stamping and die-making departments. Ten presses with individual belted motor drive are located in the stamping department.

One of the simplest stampings made in this department is the clip which joins the rear forks and rear braces and also accommodates the rear axle and chain adjustment screws. Stamping, *A*, shown in Fig. 2, is made in three operations from ⅛-in. sheet steel. After blanking, the second operation consists of punching out the slot for the rear axle. These two operations could be combined and savings would be considerable on a large annual production. Under present conditions, however, two operations in simple dies have proved entirely satisfactory. The third step consists of drawing three bosses which accommodate the chain adjusting screw.

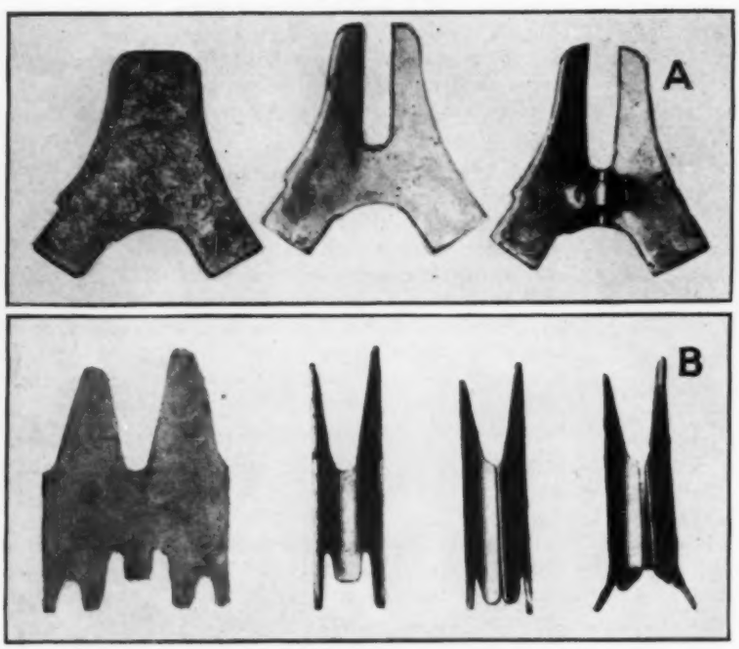


Fig. 2—Clip A, one of the simplest stampings in a bicycle, requires three operations. Four simple dies produce the reinforcement B which is inserted in the head

For making another part, the head, a number of press operations are performed. Four steps in making the reinforcement member *B* are shown in Fig. 2. At the left is the stock as it comes from the blanking die. This material is ⅛ in. thick. The second operation consists of bending the flat blank to a U-shape. The U-shape is formed into a circle in the next operation by placing a mandrel in the piece and setting it in a half-round die. The half-round punch curls the stock over the mandrel, completing the circle. The fourth operation consists of bending out the four prongs. This is done with a simple countersunk die with a hole to fit the work. The punch is cone-shaped so that when it descends the prongs are forced outward.

The head itself starts with a flat piece of stock ⅜ in. thick. The first step is to bend the stock to a U-shape, followed by drawing and piercing two holes to accommodate the reinforcement members. Four operations are necessary, after which

the stock is in the shape shown at left, Fig. 3. Then, the bosses thus formed are bent down at an angle. This is done in a half-round die provided with angular depressions into which the bosses are forced by punches. Next, the reinforcements are put in place and the prongs are spot-welded to the inner side of the head. Finally, the head is curled over a mandrel by means of a half-round punch to take the form shown at the extreme right.

Referring again to Fig. 3, the bosses leave shoulders over the reinforcements. Frame tubes butt against these bosses so that after the entire head is subjected to dip brazing the tubes make flush joints with the head, resulting in a neat and strong construction.

Fabrication of the front fork assembly requires a large number of operations. At the extreme left in Fig. 4 is the fork crown which is a drop forging. Some years ago the Shelby Cycle Company used the so-called box-type crown made of sheet metal, but the drop-forged crown employed at present is light and strong and can be produced more economically. Next to the crown is shown a piece of swaged tubing to be made into one fork. This tube is tapered. It is formed into an elliptical shape and flattened on one end. Piercing a hole at one end for the front wheel shaft and rounding

Fig. 3, above—After drawing and piercing, bosses are bent at an angle to suit the tubular cross-members. Fig. 4, below—Only four parts make up the fork, but a wide variety of operations figure in its fabrication

that end follow. Next the fork is bent between dies to form the sweep. When the fork assembly is completed it consists of the drop-forging, a shank piece and two of the formed fork members.

One of the bending dies used is shown in Fig. 5. This die forms the elliptical shape and flattens the end of the fork. Both die members are independent. Another bending die is shown in Fig. 6. By means of this tool the sweep on the rear fork is produced. The dies are machined half-round and provided with the desired outline.

A number of further press operations are involved in making up the hanger cluster. Referring to Fig. 7, the first four pieces at *A* show progressive steps in making one of the reinforcements, but the procedure does not differ materially from that described for the head reinforcement. The three pieces of drawn tubing *B* illustrate steps in making the body of the hanger. The first step is to punch four holes, one for the seat mast, one for the lower frame tube and two for the rear forks. Holes for the forks are punched first. This is done by slipping the tube over a mandrel into which the dies are set. By using these two holes for locating points the other two holes are punched at correct angles. Of course, the holes must be made elliptical to

Fig. 5—In this die each fork piece is formed to an elliptical shape and flattened on one end

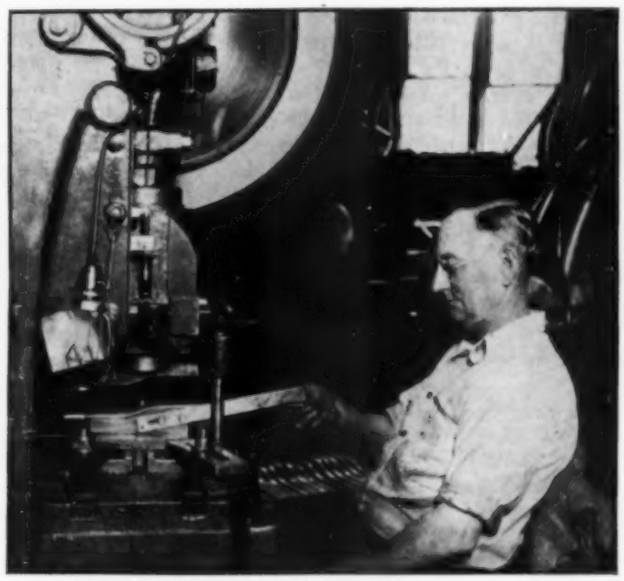


Fig. 6—A pillar die forms the sweep on the rear fork, and affords quite an inexpensive set-up

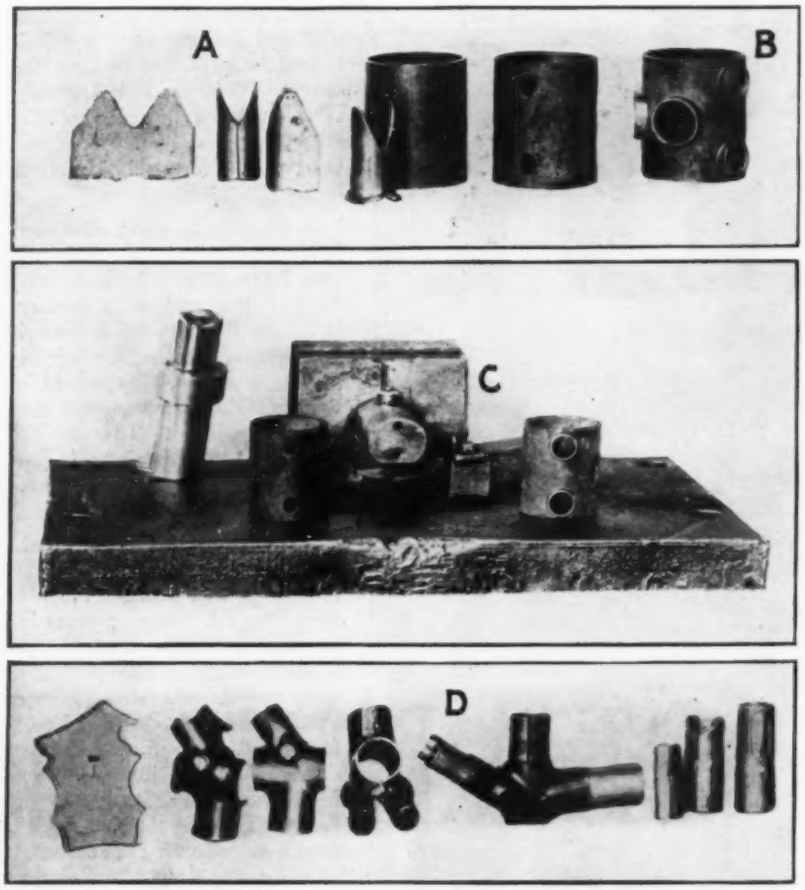


Fig. 7—Progressive steps in making the reinforcing member A are shown at the left and those for making the hanger B at the right. Elliptical holes to suit the reinforcing members for the hanger connection have bosses drawn on mandrel C fitted with dies. The seat mast cluster D is the most complicated stamped part in a bicycle

fit the angular connections. After all the holes have been punched, they are drawn to provide the bosses shown.

Drawing of the bosses on the hanger cluster is done with the type of die shown at *C* in Fig. 7. The work is slipped over a mandrel and located by a button or pilot that fits the elliptical hole. The punch is shown on the die bed at the left. As the punch descends the stock about the hole is forced into the punch to form the boss. As the fork ends and the frame tubes come against these bosses, a flush type of construction results.

A Complex Stamping

One of the most complicated pieces entering into a bicycle construction is the seat-mast cluster. Progressive steps in forming this unit are shown in Fig. 7 at *D*. The three parts at the extreme right show steps in forming one of the reinforcements. At the left the stock is blanked to form one side of the connection. This unit must be made in two parts. At a second operation the stock is drawn to shape and the hole for the seat-post bolt is drawn and pierced. As the third step the stock is curled over to form the boss for holding the rear brace reinforcement. This is a simple operation done between half-round dies.

Before two members as made above can be joined together, they must be ground flat on a disk grinder. They are then welded by the oxyacetylene flame. A cluster with the reinforcements in place ready for frame assembly is shown at *A* Fig. 7.

From the foregoing it can be seen that the making of bicycle parts is somewhat complicated and calls for a large number of blanking and forming operations. Tubular sections are always comparatively strong in themselves. Parts thus formed, then welded and dip brazed, result in frame connections that withstand successfully the hard usage to which the modern bicycle is put in the hands of the average person.

When You Get Those New Machines

THOMAS O. FORD

Pretty soon machine shops all over the country will begin to install some of the new equipment displayed at the recent Machine Tool Show, in Cleveland. Those who spend their good money on these machines should make certain that their operators fully understand all of the features that are built into them.

It is surprising how often some valuable machine function is neglected because the man on the job has never been told about it. The other day, for example, I visited one of the country's leading plants engaged in the manufacture of aircraft engines. There was a job on a vertical milling machine finishing the outside of a piston rod end.

The set-up consisted in a simple fixture which held the rod central with a circular machine table and finished the outside for about 180 deg. with a milling cutter. The operator told me he had been on the job a year and a half before he knew there was power rapid traverse to the circular table. He would set up his machine and engage the circular feed all right, but when the cut was finished on each rod, he would crank the table back to its original position by hand, a laborious job. One day the machine manufacurer's demonstrator came through the plant just as he was doing this and told the operator how the traverse could be used to save time and energy.

In this case the situation was saved more by coincidence than good management. But most works managers are not lucky enough to have a demonstrator walk past a machine at the moment the operator is using it incorrectly. Their only recourse is to make doubly sure that their men are instructed in all operating features of a machine at the outset.

Bronze on a Magnetic Chuck

CHARLES WESLOW

One time I had a job grinding several bronze plates ½ in. thick on the surface grinder. The problem was to find out how to hold the plates on the magnetic chuck. I found myself four pieces of thin B. & S. ground stock of suitable size, and fastened them at each corner of the plates with wax which I prepared with a mixture of resin. Thus the plates were held securely to the chuck.

TO GRIND HELICAL GEARS

Special equipment is not always needed, and the use of master racks, rolling cylinders and steel tape, or master involutes may be avoided

FRANCIS W. SHAW
Broadley, Whitworth, England

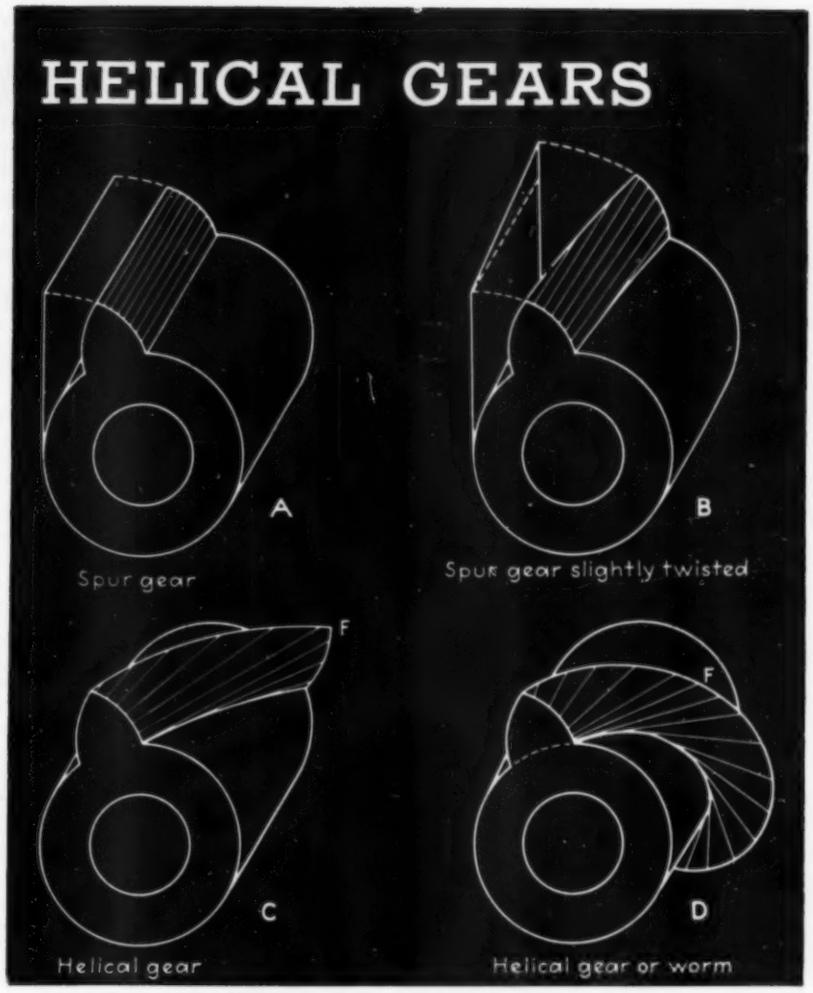


Fig. 1—Tooth profiles of all involute helical gears are made up of straight lines extending from the root to the crest and tangent to the base cylinder

MODERN helical gear grinders are generally built on the lines of the spur gear grinder. Means are added, however, to incline the axis of the blank to the axis of the abrasive wheel by the amount of the helix angle. The side surface of the wheel, a plane, is regarded as lying in the profile plane of a skew rack along which the gear blank is assumed to be rolling. For wide-faced gears the wheel is constrained to move to and fro along the teeth of the imaginary rack.

The purpose of this article is to describe an alternate method of grinding helical gears that does not require special equipment, given a suitable machine. By its use grinding is as simple as for any other class of work. In addition, such a machine can be used for worms, for which it is as good as the best standard machines.

To differentiate the method from that in which generation is secured by rolling, the term "traverse" is employed. Rolling still exists but without special provision to get it.

To see how the traverse method is applicable it is necessary to refer to the geometry of the involute helical gear. Fig. 1 shows four elementary gears. The profile of the spur gear *A* can be swept out by unwinding a band from the base cylinder. Different positions of the end of this band are denoted by lines on the profile parallel to the base cylinder. If the end of the band is inclined to its edges as at *B*, the end of the band will sweep out a helical tooth profile as it unwinds from the base cylinder. Different positions of the band are again denoted by lines on the profile, and these lines are straight. Since the lines lie in the plane of the band and the band is tangent to the base cylinder, each line must, if projected far enough, meet and be tangent to the base cylinder.

Most helical gears can better be represented by *C*. Again the straight lines are tangent to the base cylinder prolonged. Every line below *F* would extend from the root cylinder to the crest cylinder if the gear's face were extended beyond *F*.

At *D* the helix angle has been still further increased and the gear might be described as a worm. Here is clearly illustrated that the whole of the tooth surface is built up of lines all tangent to the base cylinder. Consequently, the tooth surface can just as well be swept out by a line as it unwinds from the base helix, as by a line inclined to the base cylinder at the base helix angle as it, the line, rocks on the base cylinder without slip.

Fig. 2 illustrates a helical gear successfully ground on a worm grinder to correct errors caused by distortion in heat-treatment resulting from the presence of the keyway and the unusual thinness of the metal between it and the root cylinder. This is the very job that initiated the traverse method.

In Fig. 2, *A* is one of the straight lines corresponding to those shown in Fig. 1, and which, if extended to the length *B*, would lie on the tooth profile right from the root to the crest. This line is, of course, inclined to the paper at the base helix angle.

The gear is mounted on an arbor attached to the rotating work spindle, and the abrasive wheel on the spindle of a universally adjustable grinding head. It will be clear that if the gear is screwed endwise, that is axially, at a rate in conformity with the lead of the helix at the base cylinder, the profile will remain in line contact with the wheel, and every line upon the

profile, and hence the whole profile, will be ground.

In order to assure the involute form all that is necessary, given accuracy of turning and traverse, is to locate the plane face *D* to lie accurately on the straight line *B* in the manner shown. The plane of the wheel must therefore be tilted to the plane of the paper at the same angle as this line.

The base helix angle must be calculated from the given helix angle, generally at the normal pitch cylinder. The lead having been determined in the customary manner, the base helix angle is determined by the formula:

$$\tan \text{base helix angle} = \frac{\text{base circumference}}{\text{lead}}$$

Worms having threads involute in cross-section and a thread angle in the region of 45 deg. can be produced by this method. They have been found extraordinarily efficient, and far more efficient than corresponding worms straight-sided either in longitudinal or normal sections, particularly if the base cylinder is also made the pitch cylinder.

The author has ground helical gears in ordinary worm grinding machines of the type in which indexing from thread to thread is obtained through a differential gear train. A relieving lathe—relieving for the reason that few lathes have provision for long leads—has also been employed for the purpose. In this case a universal grinding attaching was mounted on the carriage. To index, a change gear was slipped back and rotated in the usual way and reengaged.

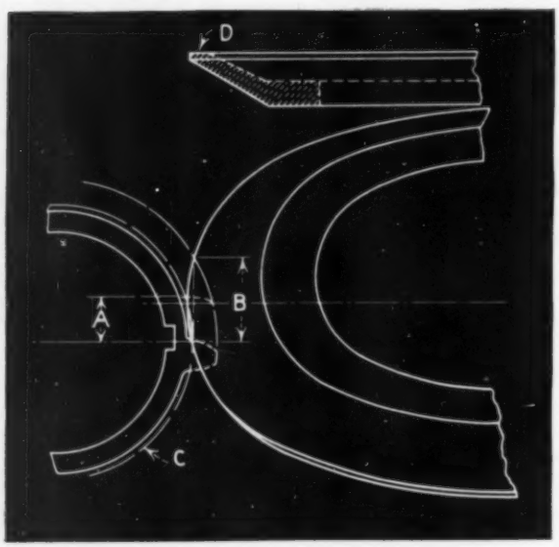


Fig. 2—As the gear screws along in the direction of its axis, the plane side surface of the wheel generates a true involute profile

If a special machine were to be designed, automatic indexing by an accurate index plate should be provided. This arrangement would assure that the leadscrew would always be in the same angular relationship with every profile, avoiding pitch errors arising from the screw and connecting gears.

A Measure of Human Progress

DEXTER S. KIMBALL
Dean of Engineering, Cornell University

The National Machine Tool Builders 1935 Exposition was without doubt the most remarkable show of its kind that has ever been presented. To the engineer and manufacturer it was a source of inspiration and information, to the layman it must have bordered on the miraculous. As a demonstration of progress in the basic tools of industry it was unsurpassed while its social and economic implications are not to be overlooked.

A most interesting exhibit was a group of old machine tools made well back in the last century and looking ancient indeed in the up-to-date atmosphere of the exposition. Judged by cutting power, accuracy, control, automaticity or beauty of purpose the difference between these veterans and the modern equipment displayed was a measure of human progress. For human progress is always measured by advances in the basic tools of production and judged by this the exposition would seem to display a new industrial background for a higher existence.

But this theory of industrial growth is not universally accepted. The one doubt that has been expressed concerning the advances shown in these new tools is that they will lead to further unemployment. In fact there are those high up in governmental circles and also in labor union councils who state that even though industry could quickly be restored to predepression volume, technological advances have been so great during the past five years as to leave millions of workers permanently unemployed. Necessarily such statements must be in the nature of guesses because statistical determination of this problem has not yet been made, and technical advance is only one factor in the many that govern unemployment. As a matter of fact this fear has been voiced continuously ever since the advent of the modern industrial era. The dwelling of Hargreaves who invented the first semi-automatic machine was mobbed and his machine destroyed. A century later the editor of the U. S. Census voiced a similar fear in a manner worth reading.

True, the first effect of time-saving machinery may and often does result in unemployment. It appears to be a natural law that no advancement can be made without rendering men and machines obsolete. Yet I have never known a critic of modern industrial methods who would be willing to forego his radio, his automobile, his telephone, or many lesser comforts, which he enjoys because of these methods, as a protest against unemployment. All history and human experience indicate that in the long run society is benefitted by technical advance. The measure of this advance is the distance between the stone hatchet and the automatic machine tool, and that portion of the journey that lies between the old machine tools exhibited at the exposition and the marvelous display of modern implements is no small part of the development.

Graphite for Lubricating Screw Threads

K. B. HUMPHREY

Some manufacturers make it a regular practice in assembling machines to apply flake graphite mixed with lubricating oil to form a paste to the threads of all screws and bolts. The graphite prevents rust and makes it easy to back out the screws or remove the nuts from bolts at any future time. This paste is also good for pipe joints.

The use of graphite paste need not be confined to the manufacturing plant, but is useful on farm machinery, automobiles or any machine around the home.

Working Contacts

When it comes to working contact between metals, the selection of the right combination counts. The new Cummins diesel engine that used only $7.63 worth of fuel from New York to Los Angeles, also upsets another common practice in the selection of metals used. Instead of using a cast iron cylinder block and aluminum pistons, it uses aluminum (Bohnalite) for the blocks, crankcase, cylinder head and valve cover and cast iron pistons.

WHEN PARTS ARE STOCKED

Is the shop's "paper work" made as simple as possible? Here is a plant with a control system that doesn't make bookkeepers of its foremen

LUCIEN I. YOEMANS
Industrial Engineer

THE FACTORY man is interested in the mechanism of putting work through the shops—the "paper work," as we call it—even more than is the cost accountant or the order writer. The latter meet this problem only infrequently and when they do they are provided with facilities for clerical work. Many people are involved in the factory production procedure, and often they are neither qualified for clerical activities nor provided with adequate facilities. The most effective factory offices are often under the hats of the foremen.

With this in mind, it is the aim of every live factory manager to simplify factory forms as much as is possible and to reduce them to the absolute minimum requirement. It is fundamental that they shall be clear and legible, free from blurs and alterations and the faint and indistinct printing altogether too common when duplicating processes are used. They must contain all necessary information, without cross reference to other papers beyond a drawing. Abbreviation must be avoided as much as is possible, and that method which provides the greatest insurance against mistakes and requires the least interpretation will always be in highest favor in the shops.

Probably, if we leave out of consideration "mass production" or the continuous manufacture or processing of a constant product, such as flour, cement, sugar, textiles, coal, steel, and such fabricated products as automobiles, refrigerators, stoves, and other continuous manufacture lines, there would remain a division in the other factory produced products of about 60 per cent to those in which the final manufactured product is more or less standardized, as to component parts, and special products form but a small part of factory production. In such cases it is usual to issue production orders for individual component parts, either finished or partly finished, and deliver them to "stock," for withdrawal and application on various assemblies, or for additional work to convert them into otherwise identified parts for special products. This is the procedure of "making everything for stock" and costs are kept on a component part basis.

It is my purpose to describe in this article a procedure developed for such production control by Addressograph-Multigraph Corporation and used by them in their own extensive factories. It is a practical and simple method and is made possible by the use of their own well known business machines.

Since everything is made for stock there is a "balance of stores" card for each component part, and this shows a minimum quantity which is set at that amount which in normal operation, based on past experience, will not be exhausted during the period of normal manufacture of a replenishment lot. It also shows the quantity to order and the normal replenishment time. Other usual details appear on the card, which is shown in Fig. 1, and attention is called to the typing in the box at the upper left hand corner, which typing is the general information on this component which will be referred to later and which is here applied by Addressograph plate impression.

The ordering of a component is initiated, when the minimum is reached, by simply removing this card, replacing with a temporary "dummy card," and sending it to the engineering department where it is checked to see that no immediate change is contemplated, or that the component is not about to become obsolescent, or that nothing has happened which will effect the normal expectation of usage. It is either approved or suitable informative comment attached and is forwarded to the statistician in the works manager's office who checks the manufacturing quantity and approves it, or changes it if the trend of usage or company policy or other factor has affected it since last ordered, and forwards it to the planning and material control division of which the production ordering is a section.

At this location there are file cabinets containing two Addressograph plates for each component part. One we will refer to as the "general information"

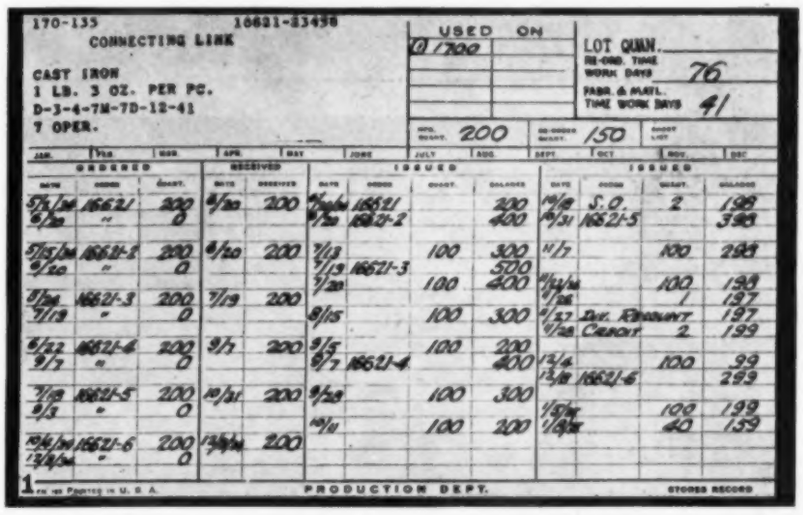

170-135 16621-83436
CONNECTING LINK
CAST IRON
1 LB. 3 OZ. PER PC.
D-3-4-7M-7D-12-41
7 OPER.
USED ON
0 1700
LOT QUAN.
RE-ORD. TIME
WORK DAYS 76
FABR. & ASSY.
TIME WORK DAYS 41
MIN. QUANT. 200
RE-ORDER QUANT. 150
ORDERED
RECEIVED
ISSUED
ISSUED
PRODUCTION DEPT.
STORES RECORD

Fig. 1—The stores record card, sent through the engineering department and the statistician to the order department, shows the entire previous usage and production of the part

plate and the other as the "operation rate" plate. They are as shown in Fig. 2.

The general information plate is inserted in an Addressograph with dating and numbering attachments, and the following forms are impressed: a 5¼x 8¾ in. envelope in which the other forms are placed for delivery to the shops, a "tracer card" 3¼x5 in., Fig. 3, upon which a pen entry of due date and quantity is also made; a "production traveler" order, 5x8 in., Fig. 4, upon which pen entries of the scheduled dates by operations and departments are made and the top margin notched to indicate due date; a 3⅛x7 in. eyelette "material tag," Fig. 5, for attachment to a part or container, having a reverse side indicating machine listing against operations to be entered later in process; and a "production material" requisition 3¼x7⅜ in., Fig. 6, for tabulating machine record.

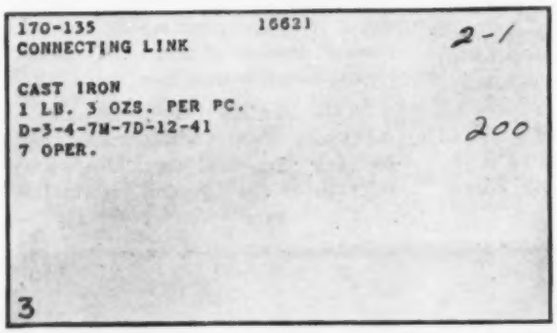
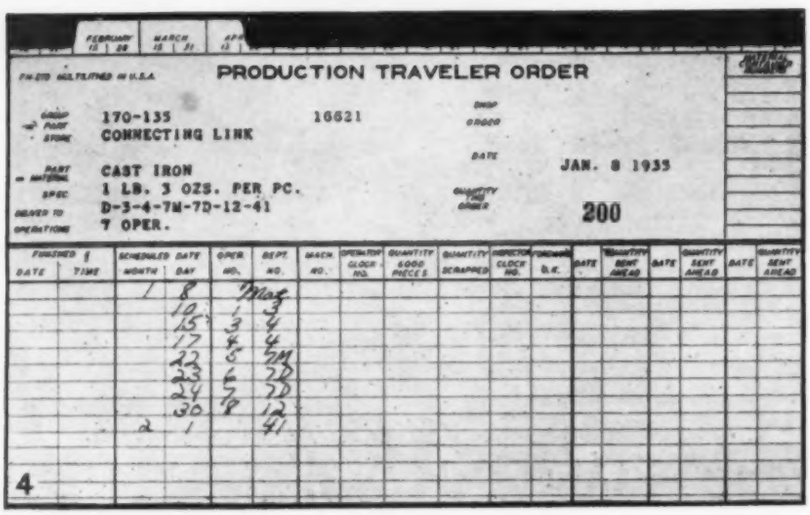


Fig. 2—General information and operating rate plates on file in the order department do all of the duplicating in the issuance of orders. Fig. 3—Progress at all times is indicated on the tracer card by pencil check against operations as move tickets come into the stores department. Fig. 4—Department and operation due dates are scheduled on the production traveler which follows the work



The operation rate plates are stacked in a magazine type Addressograph, and all necessary "productive labor" tickets are impressed. These tickets are combination tabulating machine cards 3¼x7⅜ in., Fig. 7, and it is customary to issue about 50 per cent more than the number of operations shown. All impressions are made as fast as the operator can feed the cards, and the first impression, showing the number of operations, informs the operator how many times to "repeat" before permitting plates to change automatically.

The first column of the impression from the operation rate plate shows departments, the second gives the number of the operation, the third is the piece rate for set-up, the fourth is piece rate for tear-down, the fifth, piece rate per hundred operations, and the sixth, standard time in hours per hundred pieces.

Accounting Repeat Orders

It will be noted that both plates are provided on the left with the part symbol and on the right with a perpetual manufacturing order number under which this part is always made. Eventually a resymbolization will permit the use of this perpetual order number as the part symbol. On both plates this order number is followed by a dash and a series of digits from two to six inclusive. The purpose of these is to account separate repeat orders which may be in process at one time.

This is done by the use of a "cut-off" on the machines which covers all of these digits for the first lot, and uncovers what should appear on subsequent lot orders. In the case of the plates illustrated the impression for the first lot order would be 16621, for the second, 16621-2, for the fourth, 16621-234, etc.

The envelope with all contents is sent to raw material stores, the proper entries are made on the production material requisition and it is forwarded to cost department. The material tag is attached to one part of the lot, the remaining papers to the material.

In each shop production department the time clerk has a file of plates, each of which shows the clock number and name of an employee, for use in small portable Addressograph machines.

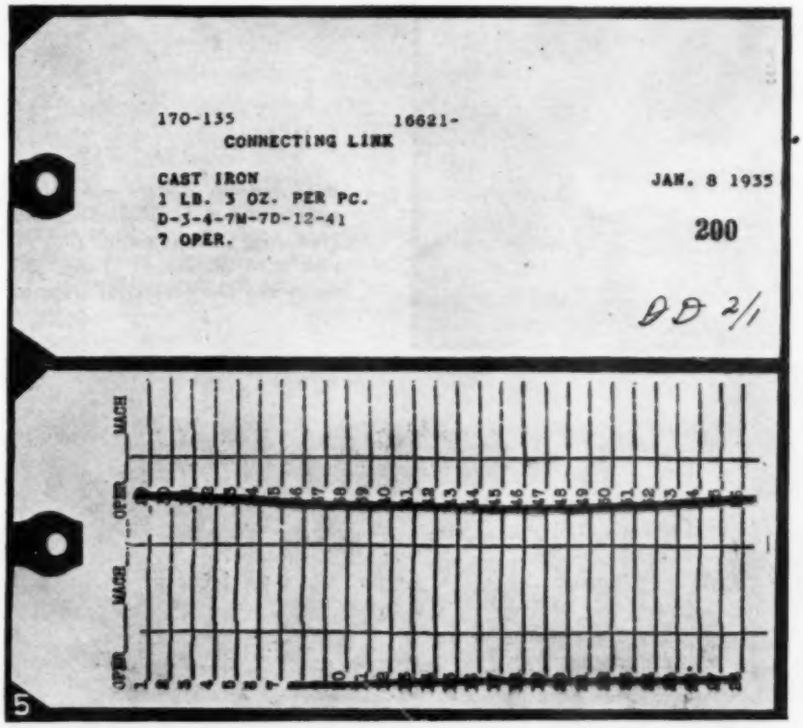
He extracts from the envelope as many combination time-tabulating ma-

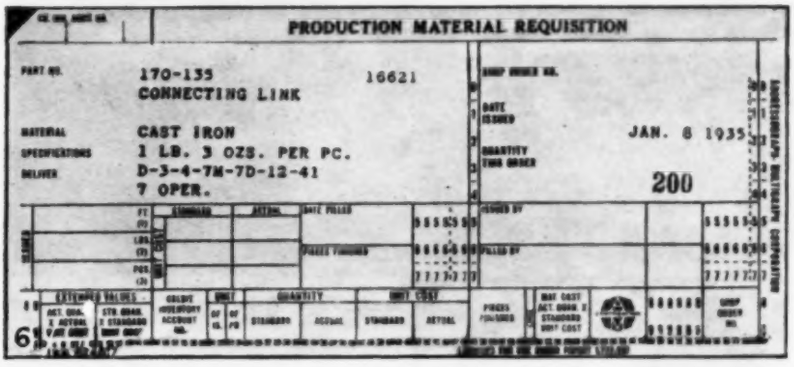
Fig. 5—The material tag gives identification on one side and routing on the reverse. Fig. 6—The production material requisition is completely written except for filling entries. Fig. 7—The productive labor ticket lacks only the operator's name and number and time stamp start and stop entries

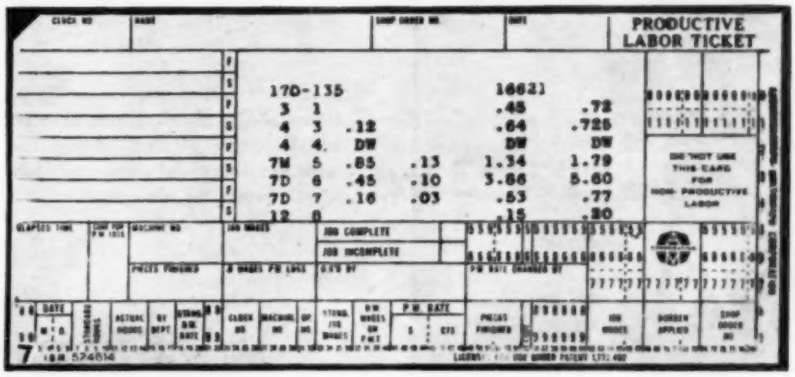
chine cards, or productive labor tickets, as there are operations to be performed in his department. He takes from his departmental files the work or instruction cards for those operations, and from them chooses the routing to machines. He makes the necessary entries on the productive labor tickets and, using the employee plates from his file, impresses the forms with the workmen's names and numbers. He then places them in the proper planning pockets in his rack for the machines upon which the work is to be done. At the same time he encloses the instruction cards in transparent wrappers and sends them to the tool crib, where all of the special and standard tools indicated are picked out and held with the cards for requisition by the machine set-up men. As the operations are completed productive labor tickets are forwarded to cost department. The move orders, as the work in process travels, are forwarded to store room where the completed operations are checked off on the tracer card.

Tracer cards are filed under due dates, which are all set to fall upon Fridays, and show at all times exactly what the status is as to the last completed operation.

Plates are written on the Graphotype machine, made by the same company, as readily and simply as if written on an ordinary typewriter, and corrections or changes in the plates may be made repeatedly by flattening the raised characters on the plates and retyping. This is a decided feature of advantage over any ink transfer scheme of duplication.






PRODUCTIVE LABOR TICKET
170-135 16621
3 1 .45 .72
4 3 .12 .64 .725
4 4 DW DW DW
7M 5 .85 .13 1.34 1.79
7D 6 .45 .10 3.86 5.60
7D 7 .16 .03 .53 .77
12 0 .15 .30
JOB COMPLETE
JOB INCOMPLETE
DO NOT USE THIS CARD FOR NON-PRODUCTIVE LABOR
7

Power Used for Grinding

Time was when grinding was largely a matter of making sparks and removing little metal. Now we talk in terms of cubic inches of metal removed per minute. Power, too, is an important factor. One engineer figures on 15 hp. per cubic in. removed per min., while another feels that 10 hp. is ample. Both agree that about 80 hp. is the economical limit for a machine; this depends more on the grinding wheel than on the machine. But improvements in both wheels and machines may change these figures materially.

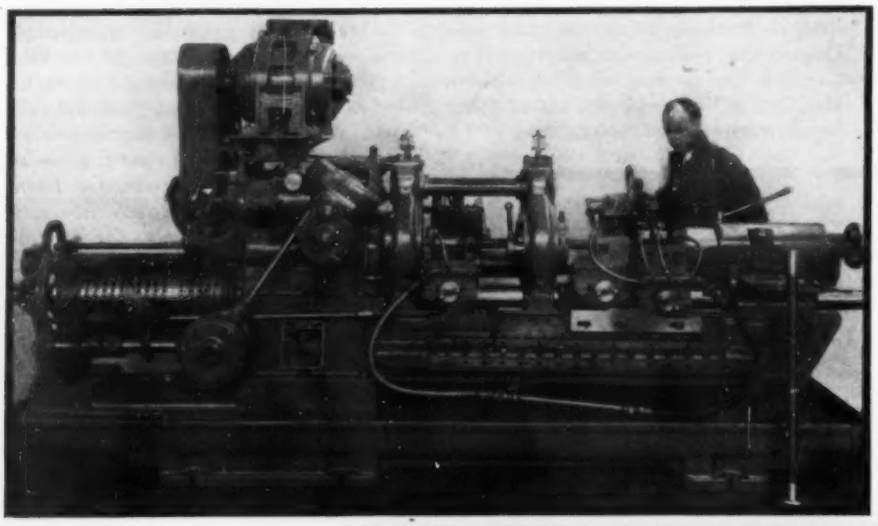
Players Have to Wait

According to *Industrial Britain*, Birmingham, England, is at present experiencing a boom in Jews' harps. As this is the only city in the world where this particular musical instrument is manufactured, prospective players, particularly in America, must wait for delivery.

The delay is due to a lack of skilled tongue setters, who have to be trained for several years before they are proficient. One firm in Birmingham is producing 100,000 harps a week, and has enough orders to keep the factory busy for three months.

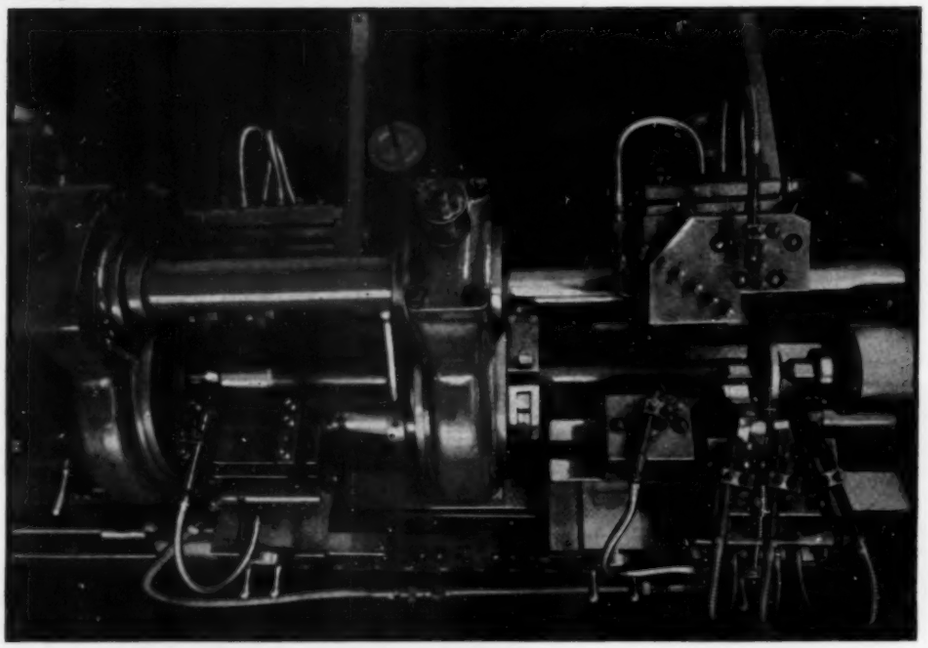
AUTOMATIC OPERATIONS on

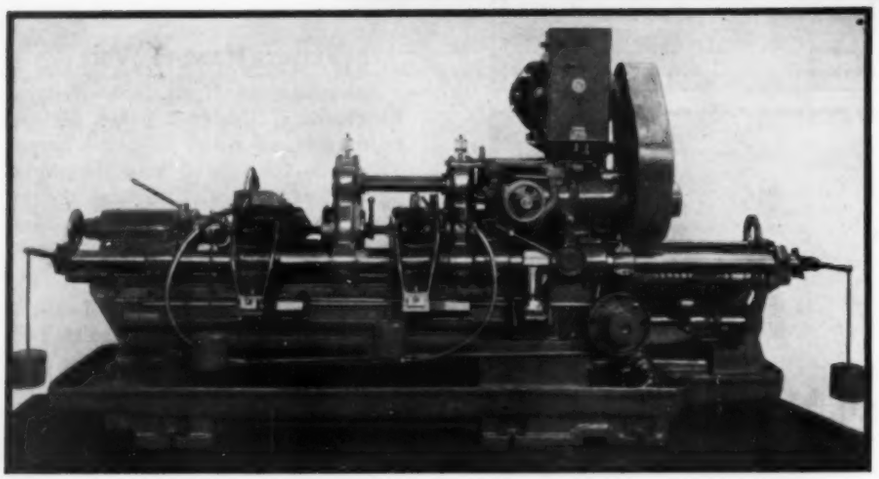
JOHN HAYDOCK
Managing Editor



Held between centers and driven by a center drive attachment, this 39-in. long shaft is turned to 2 in. with a 6½ in. flange. Three carriages and two back arms are used

The carriage nearest the tailstock straddle faces the flange, rough butt forms the outside diameter. It then rocks back and finish turns the outside diameter after the back arm has semi-finished butt formed it. This back arm also chamfers both sides of the flange, profiles and forms the head portion. The carriages on each side of the center drive attachment turn the bearing diameter on the flanged end and the splined diameter on the opposite end while the other back arm forms and chamfers each end of the splined diameter



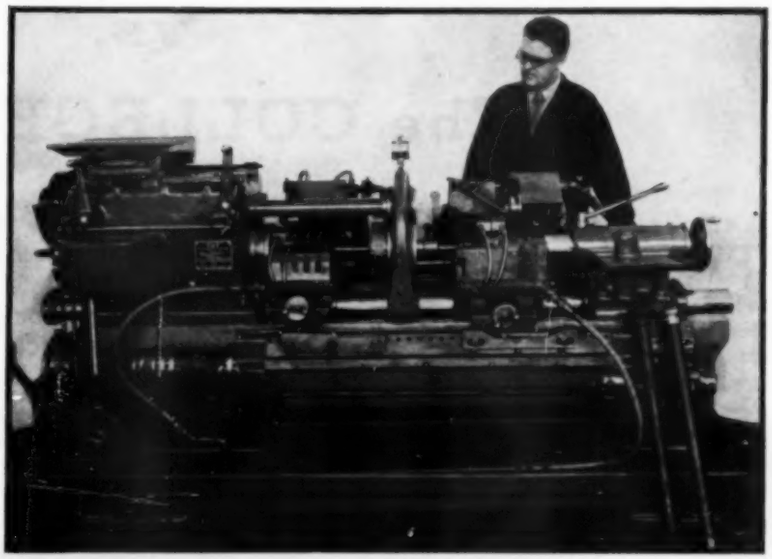


A rear view of the lathe illustrated above, which is now at work in the Soviet Union, shows the counterweights and cams for operating the back arms

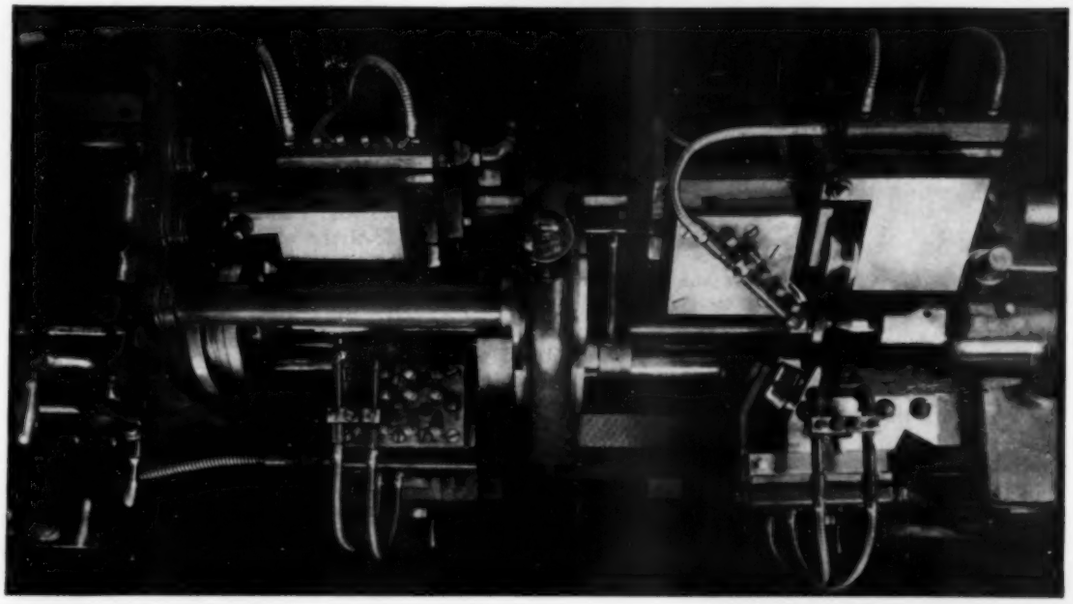
Photographs by courtesy of Jones & Lamson Machine Co.

AUTOMOTIVE AXLES

Two auto axle applications exemplify up-to-date practice in the use of multiple tooling for turning operations

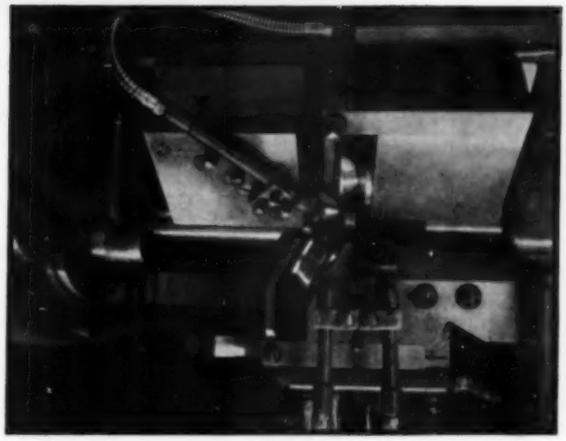


On this machine Ford truck rear axle shafts 34 3/5 in. long are turned to 2 in. diameter with a 4¼ in. bevel gear at one end



At the headstock end the carriage turns the taper and the corresponding back arm forms and chamfers the thread diameter with a circular form tool

The carriage on the tailstock end forms and chamfers the back of the gear and the bearing diameter with a circular form tool. The back arm on the tailstock end forms the face and back angles of the gear with a circular form tool and the middle back arm puts in the double undercut for grinding the bearing diameter and the back of the gear



The TRADE SCHOOL CROP

vs.

The COLLEGE CROP

H. W. TEICHROEW

Coordinator, St. Paul Vocational School

Being a collection of thoughts upon reading the article by Clement F. Freund, Dean, College of Engineering, University of Detroit (AM—Vol. 79, page 520)

THIS YEAR trade school graduates will tend filling stations but will not peddle vacuum cleaners; they are going to work in industry. There are as many as a dozen in a given plant in this Twin City area.

The employer may think he will have a little trouble with them; it's perfectly natural. The boy reports to a man who worked his way up from the bottom or to an engineer not familiar enough with vocational training today to realize that skilled help with predetermined aptitude is theirs for the asking if they will but investigate the activities of their local vocational school. The boy is nervous, and there may be tension from the start. After a week or two, things calm down, and the superintendent declares that, in spite of all he might have done, these trade school kids do a good job.

Will Tackle Anything

The reason for this lack of difficulty is probably that the trade school boy has learned to handle the tools of the trade, and someone connected with the trade school has made it his job to tell the employer where well trained help may be found. The characteristics of the trade school graduate may be somewhat different than are found in the college graduate, and it does not disturb the former when his first job is at or near the bottom.

Investigation of the records of trainees from this particular school shows that within a comparatively short time the trade school graduate establishes himself as a desirable type of employee soon after employment. He does drafting, testing, experimenting engineering and any task involving the use of instruments and measuring devices, but he does this after having served in minor production jobs long enough to have learned the ways, the methods, and the atmosphere of the place of employment so that his background is more complete and his understanding of the plant and its demands is more thorough than if he had attempted these advanced tasks immediately upon entering employment. These tasks are in line with what he has been doing in his trade school course. He enjoys the work, and he feels more sure of himself, perhaps because he is doing a job that older men are working at alongside of him.

There is no such thing as discontinuance of learning with the trade school graduate. He enters the plant on a rung of the ladder where he feels sure of himself and where he has the good will of the superintendent. His training in school, to prepare himself continually for the job next better than the one he now holds, keeps him on his toes with the result that you find him in University extension classes picking up items of knowledge which he knows he can put to use.

It is the intention of the trade school that the graduate shall have the right attitude, and it is found that in any kind of work in which his trade school training can be directly or indirectly applied he may be trusted to carry on with that same idea in mind as previously expressed, "Anything to prepare for the next job better than the one I am now doing."

Trade school graduates do not avoid punch press operations, machine molding, repetitive piece work, routine copying, or entering, tracing, drill press work, and the like because these are all parts of the job that must be done in order to give the young man the proper point of view. Trade school graduates are not polo ponies; neither are they draft horses. Monotonous tasks are a part of the training necessary for the successful tradesman, who must have a complete all around understanding of what the task is to finish a job, and the way to learn what the task is, is to do that task whether it is monotonous, repetitive, or what not. A trade school graduate surprises his employer by his unsuspected knowledge and skill and more often than not is retained on a simpler type of work than is necessary if the employer wants to get the maximum of value for the wage paid the employee.

Routine work in shipping or receiving departments, inspection in a small or highly specialized department, handling in a detached warehouse, and being a helper are all splendid phases of training for the trade school graduate who would thoroughly understand all of the work done in a given establishment; thus, it is better that he be in the atmosphere of a plant the better to prepare himself for the next better job and to get his "toe in the door."

Most Make Good

If some employer has a pet enthusiasm to which he gives much thought and attention, the trade school set-up may discover for that employer the graduate who might well fit in. Of course, employers should be patient. The boy starts slowly and awkwardly, but 99 44/100 per cent of them soon become exceedingly valuable. I need not prove that; it is in the records; and if the young man fresh from the trade school takes a job in line with his trade learned at this school, it means that he likes it, for he has already spent in the school three years or more in that field and has survived training at the hands of instructors who were successful tradesmen previous to entering the teaching field.

The vocational schools search out latent aptitudes and develop them. It is for industry to look to the trade school for the foremen of the future.

EDITORIALS

VOLUME 79 AMERICAN MACHINIST ESTABLISHED 1877 NUMBER 22

McGRAW-HILL PUBLISHING COMPANY, INC.

K. H. CONDIT • F. H. COLVIN

EDITORS

A TAX ON LABOR

WITH ROUSING cheers the delegates to the recent convention of the American Federation of Labor approved the statement of their president that labor "would fight for the thirty-hour week as it had never fought before." One cannot help but wonder how many of the delegates will be working thirty hours a week at a rate that industry can afford to pay—if the Black-Connery Bill passes—and how many are salaried officials of unions whose income will not be affected.

If the rank and file of workers in the unions and outside understood the true significance of the thirty-hour work week how many of them would be for it? How many would voluntarily cut down the amount they can earn in a week, or a year?

What the man on the job must realize is that he is in business for himself. His skill and ability to do work that some one is willing to buy, or trade dollars for, is what he has to offer in the business market. If he limits that skill and ability by reducing the hours during which he can apply it he has less to trade with, and consequently he can buy less of the things he wants.

But if he worked more than thirty hours would that lead to overproduction? Possibly, unless it were properly balanced. Yet how many of the workers themselves have ever had all they wanted, even in 1929?

Union theory is that rates can be raised enough to offset the loss caused by shortening hours. NRA tried it and stalled after three months. The building trades unions have done it and practically wiped out the building market because nobody could afford to build. In 1933 the average building trade mechanic in Ohio earned only $821 during the year as against $950 earned by a manufacturing employee whose rate per hour was less. There may be considerable personal satisfaction in knowing that you get twenty cents an hour more than another fellow gets, but it's a hollow kind of satisfaction if he has more at the end of the year.

The free citizens of this country have voted to tax themselves, when necessary, that its institutions might endure. They have had other taxes imposed upon them by elected representatives whose zeal exceeded their wisdom. But seldom has any group set out deliberately to tax away its own earnings, or possibility of earnings, as labor proposes to do through the Black-Connery Thirty-Hour Bill.

Long Deliveries

MACHINE-TOOL builders are quoting long deliveries on some models now. They will be quoting longer ones when the full effect of the Machine Tool Show is felt.

How are they going to satisfy their customers? It is too late for plant additions—if they could be justified at all. It is too late to train the kind of skilled machinists they need for work on machine tools. Such accuracy is not acquired overnight. And once it is lost by long absence from the shop it is not readily regained. In fact, some men never do recover their touch after they have been out for a year.

Overtime is one answer, and it will be a welcome one to men who have had little or no work for several years. But there is a limit to the amount of overtime a man can work and still maintain quality, no matter what he is paid.

Perhaps the answer lies in contracting out part and sub-assembly work to high-grade tool shops. These shops have the men, they should have the time because most of the automobile tool work is fairly well cleaned up, they have the versatility needed because of their long experience.

Long deliveries can be shortened considerably if tradition is ignored and the contract shops take a hand in solving another tough problem.

Flexibility

WHOEVER seeks to put any one or all of the capital goods industries into a straitjacket is attempting the impossible. By their very nature these industries must be left free to meet the wild fluctuations of the demands on them. They cannot exist if they are inflexible.

Look at the machine tool order curve for clear proof of the vital need for flexibility. In March, 1933, it was below 10. In December it had climbed to 70. By midsummer of 1934 it was back below 40. Twelve months later it stood at 125. Can anyone in his senses conceive of tying such an industry to fixed hours or fixed wages?

Not a man in this industry or in others like it but would give anything to see these violent swings smoothed out. But until there is some progress in improving this drawback to sane operation there is no need to make matters worse by trying to freeze a few of the factors involved. Future New Dealers will be well advised to study the need of the capital goods group for flexibility before trying to improve it by hard and fast rules.

Chips

Washington—Army engineers are called in as a last resort to try to save WPA . . . Shipping interests ask Roosevelt for explanation of his neutrality embargo of munitions for Italy and Ethiopia . . . Labor Board issues complaint against Pennsylvania Greyhound for firing union service mechanics . . . Chairman Madden tells AF of L convention that his board hopes that its work of organizing employees will continue . . . Navy plans expansion of fleet to treaty limits, includes battleship, 12 destroyers, 6 submarines and smaller vessels . . . Expects to increase personnel to 100,000 . . . Supreme Court agrees to pass on AAA and TVA cases to determine validity of the acts . . . McCarl ruling bars WPA aid on private projects . . . Hull leads government while Roosevelt and Garner are both out of the country.

Foreign—League council votes unanimously, assembly by big majority to apply sanctions to Italy which is held guilty of armed attack on Ethiopia . . . Italian armies press on in Africa meeting slight resistance . . . Ethiopians retaliate by raiding in Italian Somaliland . . . Monarchy is restored in Greece by bloodless military coup-d'etat . . . Complete credit blockade of Italy agreed to by 50 nations . . . Hitler sets up a "brain trust" to plan for Germany . . . Restores general staff under General Beck in defiance of Versailles Treaty provision.

Finance—Bank clearings up 25 per cent over last year . . . Gay warns of runaway inflation and points out difficulty of controlling it in view of easy money and enormous reserves.

Industry—AF of L will join American Legion in fight on Communism, also votes to push 30-hour bill once more . . . Craft union group defeats industrial union supporters . . . Orders from farm implement plants support steel rate . . . AAA claims that food prices are not up as much as wages and should not be cut . . . G.E. reports improvement of 28 per cent in billings for first three quarters of 1935, Westinghouse 33 per cent, both companies increased orders 20 per cent . . . Sales of domestic machines of all sorts up from 2 to 89 per cent.

Trade—Bi-lateral trade treaty with Colombia includes tariff reductions of from 20 per cent on passenger automobiles to 66⅔ per cent on business machines and other machinery . . . 1935 Amtorg purchases reach $33,000,000, machine tools largest item.

Indicators—Steel production holds steady above 50 per cent . . . Electric power output breaks all records . . . *Business Week's* index stationary at 67.

Major Berry Initiates New Move For Federal Control of Industry

WASHINGTON—"A rose by any other name would smell as sweet." During the early days of NRA, the flower of "partnership with business," tossed by a gracious Administration, was received at its face value until the scent of garlic was detected. The name has now been changed to "industrial cooperation" but the old odor of domination still clings to it.

Major George L. Berry, president of the International Pressmen's Union and member of the A. F. of L. executive council, is NRA's newly appointed Coordinator of Industrial Cooperation. In a letter to 6,000 business men, industrialists, former code executives and union officials, he has sent an invitation to participate in round table discussions on the "advisability of developing a permanent structure contemplating the furtherance of prosperity and stability in our industrial life."

Propaganda Begins

This action, taken with carefully prepared newspaper publicity well ahead of the expiration of the present NRA statute, next April 1, is the first public step toward permanent government control of industry and should be recognized as such. Industry's struggle for freedom of management, aided temporarily by the Schechter decision, has only begun.

Major Berry's other objective, leading to the same end, is to expediate the approval of voluntary trade practice agreements, incorporating, as a new feature, provisions for limiting hours and wages, and to act as arbiter of such limitations as agent of the President. Trade practice agreements, as before, will clear through the Federal Trade Commission, and when limited to traditional form, will not be subject to Major Berry's supervision.

Industry will be encouraged, however, to expand these by including new provisions declaring underpayment or overworking of labor, or the use of child labor, to be unfair trade practices on the theory that this will give it a means for eliminating the chiseler through voluntary action. In such cases the proposed codes will be separated into sections subject to FTC approval as before and to the new labor sections to be passed upon by Major Berry. Dual approval will be necessary before the codes become effective, and they will also be subject to review by the President. Legal authorization for such matters is contained in the Congressional resolution extending NRA in skeleton form.

James M. Landis, new Securities Exchange Commission chairman, and Charles R. Gay, New York Stock Exchange president, are being criticized in Washington on the ground that they exaggerated the danger of inflation in the sentiments voiced at the recent American Management Association meeting in New York. It is pointed out that, after all, speculation is an indication of confidence in the immediate future and that there can be no recovery without it. Few view with alarm such increases in security prices as have taken place. However, it is refreshing to have the president of the Stock Exchange, issue such a warning. It is like having the barker at a side show caution the crowd to take with a grain of salt some of the claims about the freaks.

Evidently Mr. Landis is still peeved because the SEC was not given the powers which Congress decided to vest in the governors of the Federal Reserve System. He is perfectly willing to create the impression that these powers do not exist because they are not in his vest pocket.

Little Speculation

With three quarters of all stock buying on a cash basis there is no evidence that the Reserve governors feel that there is any danger. The President has taken frequent opportunity to indicate that he regards speculation as a wicked thing, but he has no desire to suppress a return of confidence.

That the United States will be able to keep clear of the disturbances likely to grow out of the war in Africa is the prevailing opinion in Washington. If sanctions are applied the United States is not likely to make an issue of the freedom of the seas.

The President is not expected to extend the embargo on implements of war to materials used in production. If shipments are made it will be at the risk of the owners who will be told to file claim for any damages resulting from diversion of the cargo.

However, the fight to broaden the neutrality act so that the President would be authorized to prohibit export to belligerents not only of "arms, ammunition and implements of war," as the present act reads, but "munitions," so as to include cotton, copper, chemicals, acids, in fact all materials, ranging from foodstuff to mules, usually regarded as war supplies, will start with the rap of the gavel when Congress convenes in January.

Cotton producers are largely in states about which the President has no concern in the election. Copper producers are virtually all in doubtful states whose electoral votes the New Deal simply must have next year. But more important is the anti-entanglement sentiment and a wide-spread antipathy to Italy on the theory that she is the aggressor. This was indicated by the popular approval of the unexpected step by the President in warning Americans off Italian ships.

Alfred P. Sloan, Jr. Will Talk Before N.A.M.

During the Annual Congress of American Industry to be held in conjunction with the convention of the National Association of Manufacturers in New York, December 4 and 5, Alfred P. Sloan, Jr., president of General Motors, will speak at the annual dinner. The meeting this year will be held at the Commodore Hotel and will be preceded by a two-day meeting of the National Industrial Council, composed of state, local and trade groups affiliated with the N.A.M. C. L. Bardo, president of the association, and Robert L. Lund, chairman of the board, will preside over important sessions, at which industry will formulate its views just prior to the session of Congress which will convene three weeks later.

Besides Mr. Sloan, Charles R. Hook, president of the American Rolling Mill Company, W. B. Bell, president of the American Cyanamid Company, and James W. Hook, president of the Geometric Tool Company, will lead discussions upon the various national problems confronting industry.

Foundry Equipment More Active in September

September reports from 23 members of the Foundry Equipment Manufacturers Association show an improvement of more than ten per cent over August with an index of orders of 128.4. This compares with 113.0 for the preceding month and 46.4 for September of last year.

Shipments rose to 124.7 as against 97.2 in August and 37.0 in September, 1934. Unfilled orders also improved with an index of 144.5; the preceding month's figure was 142.3 and last year's 46.6.

Employee Relations Chief Topic At Gear Makers' Fall Meeting

NIAGARA FALLS, ONTARIO—A high spot of the eighteenth semi-annual meeting of the American Gear Manufacturers Association at Niagara Falls, Ontario, October 14-15, was the spirited discussion of the subject, "Educating Employees, Shop and Office," following its introduction by H. H. Kerr, president, Boston Gear Works, Inc. Mr. Kerr spoke particularly on the advantages to smaller shops in cooperating with local trade schools to train boys for their requirements. He stressed the difference between a real apprentice and a "learner," who usually remains a machine operator. A. A. Ross, General Electric Company, president of the A.G.M.A., was toastmaster at the dinner meeting.

Papers Interest Members

A notable contribution to the sessions was the paper, "Speed Increasing Gears and Their Differences From Reducing Gears," by P. C. Day, chief engineer, and W. P. Schmitter, research engineer, the Falk Corporation. This topic as presented by Mr. Schmitter proved to be a careful analysis of a series of tests on gear units designed to step up speeds.

H. N. Mathias, Westinghouse Electric & Manufacturing Co., discussed "Uniform Cost Accounting for the Gear Industry," and demonstrated the advantages accruing from the use of the Cost Manual which was adopted by the Association last spring.

Addresses by guest speakers formed a valuable contribution to the sessions. W. T. Donald, managing director, National Electrical Manufacturers Association; John Howat, metallurgist, Pittsburg Steel Foundry Corporation; Louis Ruthenberg, president, Servel, Inc.; J. O. Almen, General Motors Corporation; and J. L. Draper, Texas Co., each presented a different phase of industry.

A comprehensive anaylsis of "Trade Association Objectives, Policies and Activities Under Present Conditions" was given by Mr. Donald, who pointed out that much of the New Deal legislation which failed to pass the last session of Congress would be in the legislative mill again on January 2 or soon thereafter. He emphasized the need in a trade association for carefully planning and coordinating its efforts and exhibited a printed plan of procedure for 1936 developed by N.E.M.A. for this very purpose.

Tooth Failure Illustrated

Mr. Howat's paper, "Metallurgical Analysis of Gear Failures as Seen Through the Microscope," was accompanied by an instructive series of micro-slides. He showed the changes in composition and grain structure of steel under varying heat-treatments and then cited nine common complaints in the results achieved and the means for avoiding them.

In the absence of Mr. Ruthenburg, F. H. Fowler, Foote Bros. Gear & Machine Co., read the address, "Practical Treatment of Industrial Relations Problems," which pointed out the necessity for an effective program to insure sound relationships between the management and the working force.

"Factors Influencing the Durability of Automobile Spiral Bevel Gears" was the subject of Mr. Almen's talk. In it, he outlined some of the conclusions reached in an eight-year study of gear failures by the General Motors Research Division. He showed that tooth breakage in service is caused by fatigue and pointed out the influence of stress concentration on tooth life.

Mr. Draper, in his "Lubrication of Inclosed Gear Drives," confined himself to the principles governing the selection of lubricants as affected by the type of gear, mode of operation and method of lubrication.

Association Has Grown

In opening the two-day session, President Ross recalled that since the previous meeting held at Niagara Falls five years ago, the association has grown from 59 to 94 members. Winfield H. Smith, Inc., was admitted to company membership and the University of Illinois to academic membership on recommendation of L. R. Botsai, Westinghouse Electric & Mfg. Co., chairman of the membership committee.

The recommended practice on tooth form was officially adopted as an A.G.M.A. standard. New recommended practices favorably received were those on non-metallic gears and pinions, and oil field speed reducers. New committees have been set up on gear noise, gear geometry, and helical gears. Three subdivisions to consider steel, bronze and cast iron, respectively, were set up under the metallurgical committee. Next meeting will be held in Philadelphia, April 1936.

Gear Makers Meet—With keen awareness of their common problems and a cooperative spirit to solve them, gear manufacturers have developed an organization that typifies the best in American trade associations. Members and guests met last week at Niagara Falls, Ontario

Farm Equipment Exports Show 56 Per Cent Gain

August exports of farm equipment were valued at $4,400,996 as compared with $2,388,481 in August, 1934, and $3,842,566 in July, 1935. Total shipments for the 8-month period were valued at $22,657,213, a gain of more than 56 per cent over the $14,459,619 exported in the corresponding period of 1934. Large increases were made in shipments of harvesting machinery, threshing machines and tractors.

Navy Building Program Keeps Yards Busy

With relief cash giving a big boost, the Navy is doing well by itself. The present construction program, extending from 1933 to 1938, involves over $650,000,000. There are now 87 vessels in course of construction—33 in eight privately-owned yards, and 54 in eight navy yards. Since the passage of the Vinson Act in March, 1934, the Navy has adhered to the policy then outlined of dividing the awards equally between public and private yards. The employment curve is now breasting a plateau-like summit which will extend for an indefinite period, depending upon whether or not Congress adds more ships to the list before the volume starts to drop off. Present employment on naval construction totals 44,479 men, of which 19,099 work for private employers and 25,380 for the government. Between 35 and 50 per cent of the total outlay will be spent for shipyard labor.

F. S. Chase Heads Copper Association

F. S. Chase, president of the Chase Brass & Copper Company, was elected president of the Copper & Brass Research Association during the fourteenth annual meeting, October 11. Mr. Chase traced the course of expanding sales of copper during 1935 and predicted even better gains in 1936 for use of copper products going to the automotive and particularly the building industries. Other officers are: vice-presidents, John A. Coe, president of the American Brass Company; C. D. Dallas, president of the Revere Copper & Brass Incorporated, and Wylie Brown, president of Phelps Dodge Copper Products Corporation. The treasurer is Mr. Dallas.

Automobile Companies Rush New Models With General Lowering of Price Lists

DETROIT—Two things are outstanding in the new car announcements so far. Prices are lower, Cadillac and LaSalle following the lead of Buick in this respect. In the second place, it is now evident that many of the introductions will antedate the November 2 show. However, all will conform to the agreement made with the President that new introductions should be made within 60 days either side of October 1st. Stocks for the '36 cars are being built up rapidly. Both Buick and Olds are assembling 750 per day. The Packard schedule jumped from 6,000 in September to 7,000 in October and November. Plymouth and Pontiac are turning out around 3,000 per week. Pontiac anticipates 48,000 new cars this year and Chevrolet, counting the '35 and what remains of the year for the '36, anticipates 1,000,000 for the full calendar year.

With all these ambitious plans, it is evident that the automotive production worker will have more Christmas money than ever before. Employment at the end of September is higher than at any similar time since 1929 and the down periods for change over are now generally past, while under the plan of January 1 showing, some of these periods came as late as early December. Evidence that these present programs are well based is afforded by the reported experience of Buick and Dodge. The former, as of October 10, reported unfilled orders of 20,000 and the latter, a week after dealers' meetings, had dealers' orders totaling fifty-two million dollars as compared with thirty million at the end of the same period in 1935.

The finishing touches are about made on conveyor lines and other last minute moves before heavy production begins. The Evansville and Los Angeles assembly plants of Plymouth have already received parts for '36 cars and are reported to be ready to deliver during the month, initiating the '36 campaign for 500,000 cars. The Wyoming Avenue plant of Chrysler purchased from General Motors a year and a half ago, is serving as a warehouse, the corporation, last year, initiating the

Industrial Review

• Machine tool distributors in several sections of the country report that October business bids fair to set a record. Others say that things are moving along steadily, a few report an unexpected drop in the first half of the month. Business for the last quarter, as a whole, is generally expected to be very good.

• In the East, Boston and Philadelphia both have plenty of inquiries but have found them hard to close. New York, on the contrary, has booked some very satisfactory business. Pittsburgh finds orders scarce and inquiries fair. Sentiment is constructive, hopes politics will be kept out of business. Labor relations are not as good as they might be.

• In Northern Ohio business is on an even keel with prospects favoring improvement. There is no labor trouble at the moment but the prediction is that the winter will see several strikes. Detroit is humming with the activity incident to the introduction of new automobile models. Even standard machine tools are moving. Special tools are in good demand and supplies are active. Southern Ohio also reports active business. After the September slump machine tool orders have taken quite a jump.

• Sentiment in St. Louis is very cheerful, most shops are doing moderately good business and machine tool demand is fair. Skilled men are scarce, as they are elsewhere. Those available are decidedly short of adequate training. Chicago is decidedly optimistic although some hesitancy of buyers to close is reported by machine tool distributors. Prospects for November and December are good. In Milwaukee September was good, October not so good. Labor union organizers have been active. On the Pacific Coast September business was the best in many months. Here, too, October has slipped somewhat.

policy of larger inventories to stabilize employment. In addition to extensions to the Plymouth main plant assembly line, the Chrysler-Jefferson Avenue plant has added a storage building for 800 cars, straightened the assembly line and made extensive improvements in the body plant. The Wyoming plant was originally constructed for the Scripps-Booth car. The LaSalle was made in this plant later, and since this car was moved to the Cadillac plant, has remained idle till puchased by Chrysler.

The small Lincoln, discussed for the past year, is expected to make its bow the latter part of the month. Distinctive in design, it will be manufactured complete in the Lincoln plant, a new and separate line being constructed for it.

Two labor disturbances are to be noted in the industry within the last few days. A strike at the City Auto Stamping Company in Toledo foreshadowed the first move of the new regional labor board under the chairmanship of Ralph Lind. It is reported that as a result of this strike contracts calling for the employment of one-fifth of the force of 500 have been canceled. A one-day strike over reported dismissal of members of the Automotive Industrial Workers Association, an independent union developed as an off shoot of the Works Council movement, occurred in the Herron-Zimmers Moulding Company; aside from these the horizon seems clear.

The manufacture of automobile seat springs by L. A. Young Spring and Wire is to be extended to Chicago through the expansion of the Star Service Company. From 1,000 to 1,500 sets of cushion springs are to be made in one shift. This plant will serve the Ford branches in Chicago, St. Louis and Kansas City as well as Nash, Studebaker and the Evansville Plant of Plymouth. This is to be an assembly plant, clips and similar parts being made in Detroit. A considerable reduction in freight rates per carload dictated the move.

Machinery business is still reported good. There are no big programs in evidence, however, and some lines are reporting spotty conditions with somewhat of a lull. This lull is expected to last only until companies find spots in their lines which require bolstering.

Colombia Binds Duties on U. S. Machinery

In exchange for a promise that Colombia's coffee, bananas and minor commodities would remain on the United States free list, this country has obtained reductions on over 150 classifications and hundreds of items therein, in the latest reciprocal treaty to be negotiated. Textile, agriculture, wood, metal and stone working machinery were bound by Colombia against increases in duties. Tariffs on business machines were reduced two-thirds, autos 20-25 per cent, trucks and buses 50 per cent. United States trade with Colombia was $56,047,000 in 1929 and $21,943,000 in 1934. In the latter year the most important exports to Colombia comprised machinery, motor vehicles and electrical equipment.

Machine Tool Orders Falter Temporarily

What is viewed as a natural reaction took place in machine tool orders during September. Before the Show business was mounting rapidly under the influence of expanding domestic production and unusual foreign business. With the Show over prospective purchasers have realized more than ever the importance of considering the entire picture of modernization of the plant equipment. Many of the machine tool builders adopted the policy of selling the industry as a whole rather than running after individual sales. This temporary transfer of emphasis from immediate requirements to long-range planning had considerable to do with the drop in the index to 80.0 from 125.8 in August.

Not all of the sales made at the Show appear in the September figures. In many cases confirmation of orders awaits data on special equipment or attachments. Actual placement of the business may throw such figures into the October report.

Foreign business, which captured the stage in July and August, has dropped off again. The index now stands at 25.9 in a swift descent from the August high of 47.6. Nevertheless, the present level of orders is above the average for the first six months.

Large and small companies were on an equal footing during September. Total indexes for the two groups were 80.0 and 79.8, respectively. The large companies experienced a precipitate drop in domestic orders, the index going down to 53.0 from 77.2.

Table I—Index of Orders Based on Volume of Shipments for 1926

Month	Index of Orders: Domestic	Foreign	Total	3 Months' Average Index	% Foreign to Tota Orders
1935—March	48.5	13.8	62.3	60.3	21
April	54.5	11.2	65.6	60.3	17
May	57.3	16.0	73.3	67.1	21
June	75.5	15.6	91.1	76.7	17
July	82.5	37.3	119.8	94.7	31
August	78.2	47.6	125.8	112.2	37
September	54.1	25.9	80.0	108.5	32

Table II—Index of Orders—By Size of Companies

Month	Index of Orders: Domestic	Foreign	Total	No. of Reports	% Foreign to Total Orders
Group A—Companies reporting year's sales in 1926 of $200,000 or more:					
1935—March	48.0	14.4	62.4	94	23
April	54.8	11.8	66.6	94	18
May	57.3	16.7	74.0	83	23
June	76.0	16.0	92.0	88	17
July	80.3	38.8	119.1	87	33
August	77.2	49.3	126.5	85	39
September	53.0	27.0	80.0	87	34
Group B—Companies reporting year's sales in 1926 of less than $200,000:					
1935—March	55.7	5.5	61.2	78	9
April	48.0	3.8	51.8	75	7
May	57.3	3.2	60.5	55	5
June	68.1	10.9	79.0	69	14
July	117.6	13.8	131.4	62	10
August	95.4	19.1	114.5	58	17
September	72.0	7.8	79.8	63	10

Table III—Distribution of Orders

(Shown by indexes of individual companies)

New Orders in % of 1926 Shipments	Number of Reports in Each Index Group: Mar.	April	May	June	July	August	September
200 or more	6	7	6	14	31	22	10
100–199	25	21	21	31	35	33	30
90–99	8	3	8	8	5	3	7
80–89	5	9	3	8	7	6	5
70–79	9	13	11	10	8	5	4
60–69	7	13	6	10	8	10	8
50–59	15	13	8	5	14	10	14
40–49	21	16	9	7	9	12	11
30–39	21	14	11	15	7	8	22
20–29	13	17	15	15	9	10	14
10–19	23	18	11	14	6	9	8
Less than 10	19	25	29	20	10	16	17
Total Reports	172	169	138	157	149	144	150

Welding Forum Arranged by Acetylene Association

During the 36th annual convention of the International Acetylene Association, at the Hotel Cleveland, Cleveland, Ohio, November 12 to 15, an added feature of interest to welding superintendents and foremen will be a welding and cutting forum on November 13. The forum is divided into three sections as follows: Part I—Materials Used in the Oxy-Acetylene Process; Oxy-Acetylene Cutting—Theory and Practice; and Identifying Metals to be Welded. Part II will cover "Safe Practices in Using the Oxy-Acetylene Process" by James I. Banash, past-president, National Safety Council, and consulting engineer. In Part III, John J. Crowe, president of the American Welding Society will speak on "Testing Welds and the Welded Structure." The forum is scheduled for 8:15 P. M.

Printing Equipment Men Hold Annual Meeting

The National Printing Equipment Association, Inc., held its annual meeting on Oct. 16 in New York. The following officers were elected: president, Joseph T. Mackey, executive vice-president of the Mergenthaler Linotype Co.; vice-president, Thomas R. Jones, president of the American Type Founders Sales Corp.; treasurer, James S. Gilbert, president of the Dexter Folder Co.; and secretary, James E. Bennet, president of the Babcock Printing Press Mfg. Co. The retiring president, Arthur Bentley of the Miehle Printing Press & Mfg. Co., remains as a director and on the executive committee.

OBITUARIES

F. A. Halsey, Wage Premium Pioneer, Dies

Frederick A. Halsey, 79, author of the Halsey premium system of wage payment, died Oct. 20. His system has been called the forerunner of time study and wage incentives to increase output. It won for him the first award, in 1923, of the gold medal of the American Society of Mechanical Engineers. At the time he developed the premium system, Mr. Halsey was engineer and general manager of the Rand Drill Co., now a part of the Ingersoll-Rand Co. While there he invented the Slugger rock drill.

From 1894-1911 Mr. Halsey was an editor of *American Machinist*, the last seven years as editor-in-chief. He opposed the adoption of the metric system in this country, and a paper he presented before the A.S.M.E. was responsible for the ultimate defeat of a measure before Congress. The American Institute of Weights & Measures was organized at that time to oppose the metric system, and Mr. Halsey was elected commissioner.

A more extended account of Mr. Halsey's life will apear in the next number.

James Clark, Jr., president of James Clark, Jr. Electric Co., Louisville, Ky., died Oct. 16. Mr. Clark graduated from the Massachusetts Institute of Technology in 1890. In 1892 he formed the partnership of Cooper & Clark, probably the first electrical supply firm in the South. He was 66.

J. S. Gillespie, president, American Hollow Boring Co., Erie, Pa., died Oct. 8. Mr. Gillespie has headed the company since 1918.

Albert B. Klise, owner of Blackmer Rotary Pump Co., Grand Rapids, Mich., died recently. Mr. Klise became interested in the company in 1912 and became its sole owner in 1925. He was 72 years old.

Albert R. Longenecker, 39, general manager of Perry Furnace Co., Erie, Pa., was killed in an automobile accident October 16.

PERSONALS

Manley E. Lord, secretary of the manufacturing committee of General Electric Co., since July 1, 1930, has been made coordinator of all refrigeration manufacturing units of the company according to an announcement by W. R. Burrows, vice president in charge of manufacturing. Armand T. Chandonnet, of Mr. Burrows staff, will succeed Mr. Lord.

Fred Penski has been appointed production manager of Midwest Vehicle Corporation, Tiffin, Ohio.

John Primrose, vice president of Foster Wheeler Corporation since it was organized, has been appointed vice-chairman following the resignation of Pell W. Foster, who will continue as a director.

Talmadge C. Cherry has been elected president and director of Die Press Co., Cazenovia, N. Y., to fill the vacanacy left by David L. Bacon, who resigned. Other officers chosen at the annual meeting are: Walter T. Hart, Jr., vice president and general manager, and Francis J. McCarthy and F. A. Benedict, directors.

Charles F. Scott, professor emeritus of electrical engineering, Yale University, was elected chairman of the Engineers' Council for Professional Development at the third annual meeting held in New York, Oct. 8. Professor Scott succeeds C. F. Hirshfeld, chief of research of the Detroit Edison Co., who has served two terms.

George R. Woods, R. S. Stokvis & Sons, Inc., New York, sailed on the *Statendam* last week to visit the European offices of his company.

James L. Wick, Jr., president and general manager, Falcon Bronze Co., Youngstown, Ohio, and a director of the American Foundrymen's Association, has been elected vice-president of the Association. Mr. Wick will fill the vacancy caused by the death of B. H. Johnson.

Robert S. Alter, foreign sales manager of the American Tool Works Co., was elected president of the Foreign Trade Club of the Cincinnati Chamber of Commerce.

P. O. Geier, chairman of the board, Cincinnati Milling Machine and Cincinnati Grinders, Inc., has been elected trustee of the Cincinnati Southern Railway.

BUSINESS ITEMS

J. B. Clancy, Inc., theatrical hardware manufacturer, Syracuse, N. Y., has been purchased by George Lee Scherrer and Charles Tompkins, who have organized the Clancy Mfg. Co., to take over and continue operation of the business, founded in Syracuse in 1885 by the late J. B. Clancy. Mr. Tompkins is president and general manager of the new concern and Mr. Scherrer, secretary and treasurer.

R. G. Haskins Co., Chicago, announces the appointment of two new sales representatives: Maurice Owens, with headquarters at 82 Harvard St., Newtonville, Mass., as exclusive distributor of the line of flexible shaft equipment in the New England states; W. F. Himmelsbach, with headquarters at 202 Sands St., Oneida, New York, will serve the New York territory with the exception of several counties adjacent to New York City.

Mackintosh - Hemphill Co., Pittsburgh, has filed an application to reorganize under the provisions of Section 77B. The Mackintosh-Hemphill Co., with plants at Pittsburgh and Midland, Pa., and Wooster, Ohio, has been in existence since 1803.

The Holman Reamer Co., Manchester, Conn., has recently been organized by Charles W. Holman. They are putting on the market an improved helical taper pin reamer, the result of Mr. Holman's fifteen years ex-

perience in cutting tool manufacture.

P. M. Mahler & Co., Inc., announce that P. M. MAHLER, president, will travel for four months in Panama, Chile, Peru, Brazil, and Argentina as representative for wood-working and metal-working machinery manufacturers.

The Metal Specialty Co., Cincinnati, Ohio, has established a branch plant at Kokomo, Ind., in the buildings formerly occupied by the Haynes Motor Co. Operations at the Kokomo plant will start late in October.

Joseph T. Ryerson & Son, Inc., has completed an extensive addition to its Jersey City plant, making an additional 45,000 square feet of floor space available for the stocking of steel and allied lines.

The Skinner Chuck Co., New Britain, Conn., warns its customers against an imposter representing himself as an agent or representative of the company, and who may try to procure funds on the strength of stolen data on confidential prices for special chucks.

The Udylite Co., Detroit, Mich., has opened a new warehouse in Chicago for the convenience of customers in that territory. For Wisconsin they have appointed Donald Sales and Mfg. Co., Milwaukee, as distributors of plating and polishing supplies.

Western Machine Tool Works, Holland, Mich., has appointed C. E. MCARTHUR general sales manager. Mr. McArthur was formerly secretary and sales manager of Modern Tool Co., Erie, Pa. After that he was associated with Consolidated Machine Tool Corporation of America when the former merged with this corporation.

MEETINGS

AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Annual meeting, Dec. 2-6. Engineering Societies Bldg., New York. CLARENCE E. DAVIES, secretary, 29 West 39th St., New York, N. Y.

CHEMICAL INDUSTRIES. Fifteenth exposition, Dec. 2-7. Grand Central Palace, New York. CHARLES F. ROTH, manager, Grand Central Palace Bldg., New York, N. Y.

INTERNATIONAL ACETYLENE ASSOCIATION. Thirty-sixth annual convention, Nov. 12-15. Cleveland Hotel, Cleveland, Ohio. H. F. REINHARD, secretary, 30 East 42d St., New York, N. Y.

NATIONAL ASSOCIATION OF MANUFACTURERS. Annual meeting, Dec. 4-5. Hotel Commodore, New York. NOEL SARGENT, secretary, 11 West 42d St., New York, N. Y.

NATIONAL AUTOMOBILE SHOW. Thirty-sixth annual exhibit, Nov. 2-9, New York. ALFRED REEVES, manager.

SOCIETY OF AUTOMOTIVE ENGINEERS. Annual dinner, Nov. 4. Hotel Commodore, New York. Annual meeting, Jan. 13-17, 1936. Book Cadillac Hotel, Detroit, Mich. JOHN A. C. WARNER, secretary, 29 West 39th St., New York, N. Y.

PATENTS

October 1, 1935

Metal-Working Machinery

Machine Tool. Ray I. Martin, Dayton, Ohio, assigned to The Cimatool. Patent 2,015,685.

Cam Escapement Welding Machine. William A. Weightman, Detroit, Mich., assigned to Budd Wheel Co. Patent 2,015,914.

Machine for Joining Upholstery Springs. Chace D. Gilmore, West Chester Pa., assigned to Peerless Springs, Inc. Patent 2,015,927.

Double Ram Flash Removing Machine. Henry E. Morton, Muskegon, Mich. Patent 2,015,955.

Machine for Straightening Rods or Pipes. Thomas Wilson Hartley, Seisdon, near Wolverhampton, England. Patent 2,016,038.

Tools and Attachments

Electrode for Arc Welding. August R. Nyquist, Roseau, Minn. Patent 2,015,814.

Tool Holder for Two-Way Planing. Georges Brunner, Zurich, Switzerland. Patent 2,015,919.

Feeding Mechanism for Can Making Machines. Hugo F. Bayer, La Grange, Ill., assigned to Continental Can Co., Inc. Patent 2,015,987.

Welding Apparatus, John G. Lincoln, Aurora, Ohio, assigned to the Davis Welding & Manufacturing Co. Patent 2,016,043.

October 8, 1935

Metal-Working Machinery

Grinding Apparatus. Fay A. Thompson, Colfax, Iowa. Patent 2,016,351.

Lathe. Leo A. Dumser and Clement J. Schroeder, Rockford, Ill., assigned to Sunstrand Machine Tool Co. Patent 2,016,365.

Collapsible Tube Capping Machine. John H. Friden, East Orange, N. J., assigned to the Sun Tube Corp., Hillside, N. J. Patent 2,016,424.

Connecting or Splicing Device for Wires. Philip Henry Kelley, Greenfield, Mass. Patent 2,016,441.

Galvanizing Apparatus. Karl Merkenschlagerm, Nurenberg, Germany. Patent 2,016,446.

Centerless Cylindrical Grinding Machine. Heinrich Becker, Hattingen-on-the-Ruhr, Germany. Patent 2,016,478.

Turning Machine. Frank H. Adams, Cleveland Heights, Ohio, assigned to the Cleveland Hobbing Machine Co. Patent 2,016,570.

Abrasive Machine. William W. Price and Charles W. Ripsch, Dayton, Ohio, assigned to the Buckeye Portable Tool Co. Patent 2,016,725.

Sheet Metal Forming Machine. Henry A. Berliner and Christian De Boer, Washington, D. C., assigned to the Engineering and Research Corp. Patent 2,016,981.

Tools and Attachments

Bending Tool. Joseph Sunnen, Kirkwood, Mo. Patent 2,016,463.

Fluxing and Bonding Composition for Use in Welding or Brazing. Cleburne A. Basore and Daniel T. Jones, Auburn, Ala., assigned to the Chemical Research & Development Co. Patent 2,016,585.

Chuck. Lora E. Poole, Anderson, Ind., assigned to General Motors Corp. Patent 2,016,652.

Welding Apparatus. Harold H. Lurie, La Fayette, Ind., assigned to Utilities Research Commission, Inc. Patent 2,016,866.

Welding Electrode. Joseph H. Humberstone, Schenectady, N. Y., assigned to General Electric Co. Patent 2,016,899.

Hydraulic Mechanism for Determining the Path of Movement of a Tool or Other Element. Clement C. Richard, Detroit, Mich., assigned to Otis K. Richard and Clifford H. Kain. Patent 2,016,931.

Control Mechanism for Grinding Machines. Herbert A. Silven, Worcester, Mass., assigned to Norton Co. Patent 2,016,032.

Processes

Method of Making Castellated or Slotted Nut Blanks or the Like. William McLure Rosborough, Charlotte, N. C. Patent 2,016,296.

Process for Producing Enameled Articles. Phillipp Eyer, Halberstadt, Germany. Patent 2,016,322.

Method of Welding. George A. Lutz, Cranford, N. J., assigned to American Circular Loom Co., Inc. Patent 2,016,380.

Method and Apparatus for Electric Welding. Frank W. Cramer, Youngstown, Ohio, assigned to Republic Steel Corp. Patent 2,016,414.

Electrodeposition of Chromium. Oskar Kramer, Leipzig, Germany, assigned to Theodor Haebler. Patent 2,016,677.

Method and Apparatus for Electric Resistance Welding of Metals. David Sciaky, Paris, France. Patent 3,016,728.

Art of Electric Arc Welding. Walter Reginald Hume, Melbourne, Victoria, Australia, assigned to Hume Steel Limited. Patent 2,017,003.

October 15, 1935

Metal-Working Machinery

Machine for Scoring Metal Containers or Parts Thereof. Isodor Newman, New York, N. Y. Patent 2,018,103.

Machine for Forging Hollow Metal Blanks. Ezio Giacchino, Brussels, Belgium. Patent 2,017,310.

Casting Furnace. Elmer H. Berryman, San Francisco, Cal. Patent 2,017,337.

Rotary Shears, Fred E. Kling, Youngstown, Ohio. Patent 2,017,366.

Device for Cleaning and Polishing Metallic Sheets. Alva F. Warden, Gary, Ind., assigned to American Sheet & Tin Plate Co. Patent 2,017,381.

Circle Cutting or Welding Machine. James L. Anderson, Closter, N. J., assigned to Air Reduction Co. Patents 2,017,429-30.

Tool Grinding Machine. Patrick T. Lennon, Cleveland, Ohio. Patent 2,017,465.

Machine for the Guidance of Tools and More Particularly of Fusing Burners. Adam Schmidt, Vienna, Austria. Patent 2,017,475.

Automatic Copying Lathe. Aaron Shatkin, Brooklyn, N. Y. Patent 2,017,513.

Tools and Attachments

Filter Window for Welders' Helmets. Edwin U. Gingg, San Francisco, Calif. Patent 2,017,059.

Tool Attachment. Hugh M. Hodge, Detroit, Mich., assigned to George A. Vis. Patent 2,017,247.

Spindle Construction. John W. Parker, Detroit, Mich. Patent 2,017,290.

Explosively Actuated Device. Robert Temple, Jr., Brooklyn, N. Y. Patent 2,017,329.

Die. Edward M. Murphy, Lakewood, Ohio, assigned to The American Steel & Wire Co. Patent 2,017,373.

Metallurgical Furnace. Paul B. Tonnar, Cleveland, Ohio. Patent 2,017,480.

Arc Welding Electrode. Lionel E. Faulkner, Hillside, N. J., assigned to Wilson Welder & Metals Co. Patent 2,017,488.

Arc Welding Apparatus. Samuel C. Osborne, Euclid City, Ohio, assigned to Wilson Welder & Metals Co. Patent 2,017,509.

Drill Sharpening Mechanism. Nicholas J. Elter and David B. St. Jacques, New York, N. Y. Patent 2,017,532.

Apparatus for Corrugating Sheet Metal Receptacles. Jacques Stanitz, Warren, Ohio. Patent 2,017,574.

Processes

Method of Making Blanks. Norman W. Cummins, Louisville, Ky., assigned to The National Machinery Co. Patent 2,017,341.

Method of Making a Metal Container. John F. Werder, Lakewood, Ohio, assigned to Edmund Rogers. Patent 2,017,361.

Production of Cam Shafts and Other Noncircular or Eccentric Bodies. John Morris, Wolverhampton, England, assigned to Sunbeam Motor Car Co. Limited. Patent 2,017,371.

Method and Apparatus for Welding Tubes. Heinrich Esser, Hilden, Germany. Patent 2,017,397.

Method of Processing Sheet Metal. Edwin T. Lorig and Carl E. Moore, Gary, Ind., assigned to American Sheet & Tin Plate Co. Patent 2,017,403.

Method of Making Bearings. Berger Stockfleth, Niles, Mich., assigned to the Cleveland Graphite Bronze Co. Patent 2,017,448.

American Machinist

REFERENCE BOOK SHEET

Cutting Speed Conversion Table

This table for cutting speeds of 200-500 ft. per min. supplements existing tables of lower speed ranges. It is designed for use with the newer cutting materials and the non-ferrous alloys cut at high speeds

Diam. in Inches	FEET PER MINUTE														
	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550
	REVOLUTIONS PER MINUTE														
1/8	6,112	6,878	7,642	8,405	9,171	9,935	10,699	11,463							
3/16	4,076	4,585	5,095	5,604	6,114	6,623	7,133	7,642	8,152	8,661	9,171	9,680	10,190	10,699	11,209
1/4	3,056	3,438	3,820	4,202	4,584	4,966	5,348	5,730	6,112	6,494	6,876	7,258	7,640	8,022	8,404
5/16	2,444	2,749	3,055	3,360	3,666	3,971	4,277	4,582	4,888	5,193	5,499	5,804	6,110	6,415	6,721
3/8	2,036	2,292	2,547	2,802	3,057	3,311	3,566	3,821	4,076	4,330	4,585	4,840	5,095	5,349	5,604
7/16	1,748	1,965	2,183	2,402	2,620	2,838	3,057	3,275	3,494	3,712	3,930	4,149	4,367	4,585	4,804
1/2	1,528	1,719	1,910	2,101	2,292	2,483	2,675	2,866	3,057	3,248	3,439	3,630	3,821	4,012	4,203
9/16	1,358	1,528	1,698	1,868	2,037	2,207	2,377	2,547	2,717	2,887	3,056	3,226	3,396	3,566	3,736
5/8	1,224	1,375	1,528	1,681	1,834	1,987	2,139	2,292	2,445	2,598	2,751	2,904	3,057	3,209	3,362
11/16	1,110	1,250	1,389	1,528	1,667	1,806	1,941	2,084	2,223	2,362	2,501	2,640	2,779	2,917	3,056
3/4	1,016	1,146	1,273	1,401	1,528	1,655	1,783	1,910	2,038	2,165	2,292	2,420	2,547	2,674	2,802
13/16	948	1,058	1,175	1,293	1,410	1,528	1,646	1,763	1,881	1,998	2,116	2,233	2,351	2,469	2,586
7/8	876	982	1,091	1,200	1,310	1,419	1,528	1,637	1,746	1,855	1,965	2,074	2,183	2,292	2,401
15/16	814	917	1,019	1,120	1,222	1,324	1,426	1,528	1,630	1,732	1,834	1,936	2,038	2,139	2,241
1	764	859	955	1,050	1,146	1,241	1,337	1,432	1,528	1,623	1,719	1,814	1,910	2,006	2,101
1 1/16	718	809	899	988	1,078	1,168	1,258	1,348	1,438	1,528	1,618	1,708	1,798	1,887	1,977
1 1/8	680	764	849	933	1,018	1,103	1,188	1,273	1,358	1,443	1,528	1,613	1,698	1,782	1,867
1 3/16	644	724	804	884	965	1,045	1,126	1,206	1,287	1,367	1,448	1,528	1,609	1,689	1,769
1 1/4	612	687	764	840	917	993	1,069	1,146	1,222	1,299	1,375	1,452	1,528	1,604	1,681
1 5/16	582	654	727	800	873	946	1,018	1,091	1,164	1,237	1,309	1,382	1,455	1,528	1,601
1 3/8	556	625	694	764	833	903	972	1,042	1,111	1,181	1,250	1,320	1,389	1,458	1,528
1 7/16	530	598	664	730	797	863	930	996	1,063	1,129	1,196	1,262	1,329	1,395	1,461
1 1/2	508	573	636	700	764	827	891	955	1,018	1,082	1,146	1,209	1,273	1,337	1,400
1 9/16	488	550	611	672	733	794	855	916	978	1,039	1,100	1,161	1,222	1,283	1,344
1 5/8	468	528	587	646	705	764	822	881	940	999	1,057	1,116	1,175	1,234	1,293
1 11/16	452	509	566	622	679	735	792	849	905	962	1,018	1,075	1,132	1,188	1,245
1 3/4	436	491	545	600	654	709	764	818	873	927	982	1,036	1,091	1,146	1,200
1 13/16	422	474	527	579	632	685	737	790	843	895	948	1,001	1,054	1,106	1,159
1 7/8	408	458	509	560	611	662	713	764	815	866	917	968	1,019	1,069	1,120
1 15/16	394	443	493	542	591	640	690	739	788	838	887	936	986	1,035	1,084
2	382	429	477	525	573	620	668	716	764	811	859	907	955	1,002	1,050
2 1/8	360	404	449	494	539	584	629	674	719	764	809	854	899	943	988
2 1/4	340	382	424	468	509	551	594	636	679	721	764	806	849	891	933
2 3/8	322	362	402	442	482	522	563	603	643	683	724	764	804	844	884
2 1/2	306	343	382	420	458	496	534	573	611	649	687	725	764	802	840
2 5/8	290	327	363	400	436	472	509	545	582	618	654	691	727	763	800
2 3/4	278	312	347	381	416	451	486	520	555	590	625	659	694	729	763
2 7/8	264	299	332	365	398	431	465	498	531	564	598	631	664	697	730
3	254	286	318	350	381	413	445	477	509	541	572	604	636	668	700
3 1/8	244	274	305	336	366	397	427	458	488	519	549	580	611	641	672
3 1/4	234	264	293	323	352	381	411	440	470	499	528	558	587	616	646
3 3/8	226	254	283	311	339	367	396	424	452	481	509	537	566	594	622
3 1/2	218	245	272	300	327	354	381	409	436	463	490	518	545	572	600
3 5/8	210	237	263	289	316	342	368	395	421	447	474	500	527	553	579
3 3/4	205	229	254	280	305	331	356	382	407	433	458	484	509	534	560
3 7/8	197	221	246	271	295	320	345	369	394	419	443	468	493	517	542
4	191	214	238	262	286	310	334	358	382	405	429	453	477	501	525
4 1/4	180	202	224	247	269	292	314	337	359	382	404	427	449	471	494
4 1/2	170	191	212	233	254	275	297	318	339	360	382	403	424	445	466
4 3/4	161	180	201	221	241	261	281	301	321	341	361	381	402	422	442
5	153	171	191	210	229	248	267	286	305	324	343	362	382	401	420
5 1/4	145	163	181	199	218	236	254	272	290	308	327	345	363	381	399
5 1/2	139	156	173	190	208	225	242	260	277	294	312	329	347	364	381
5 3/4	133	149	166	182	199	215	232	249	265	282	298	315	332	348	365
6	127	143	159	174	190	206	222	238	254	270	286	302	318	333	349
6 1/4	122	137	152	168	183	198	213	229	244	259	274	290	305	320	336
6 1/2	117	132	146	161	176	190	205	220	234	249	264	278	293	308	322
6 3/4	113	127	141	155	169	183	198	212	226	240	254	268	283	297	311
7	109	122	136	149	163	177	190	204	218	231	245	258	272	286	299
7 1/4	105	118	131	144	158	171	184	197	210	223	237	250	263	276	289
7 1/2	102	114	127	139	152	165	178	190	203	216	229	241	254	267	279
7 3/4	98.4	111	123	135	148	160	172	185	197	209	222	234	246	258	271
8	95.6	107	119	131	143	155	167	179	191	203	215	226	238	250	262

Ideas FROM PRACTICAL MEN

Accurate Two-Way Indexing

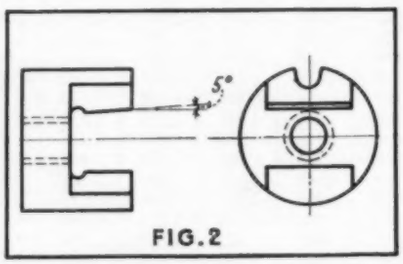
HARRY LITTLE

In chromatic printing and in printing body type in more than one color, it is necessary to have register marks, usually in the form of a cross, on each cylinder carrying a separate color. The register marks are printed on the paper, so that if the cylinders are out of alignment the printed register marks will show both the direction and the amount the cylinders must be moved to align them to keep the colors in register. Thus it will be seen that the register marks must be accurately located in relation to the design on each cylinder.

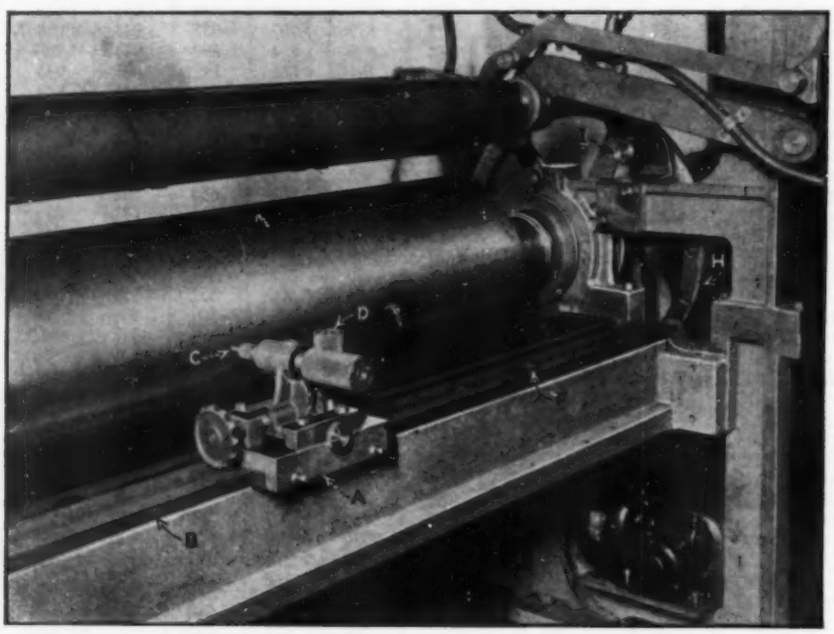
In Fig. 1 are shown the essential parts of a machine for indexing the cylinders both axially and circumferentially and making the cross-like register marks.

The carriage *A* is mounted on the crossrail *B* and carries the marking stylus *C* and the index pin *D*. Inserted in the crossrail at predetermined distances are hardened steel plugs *F* having slots in which the flat sides of the index pin engage. One side of the slots in the plugs and the mating side of the flats on the index pin are tapered at an angle of 5 deg. to create a wedging action when the pin engages the slot.

Similar slotted plugs are inserted in the side of the rim of the handwheel *H* mounted on the cylinder shaft, the index pin for which is at *I* on the frame. The plugs in both the handwheel and the crossrail can be removed by a jackscrew entered in tapped holes behind the plugs. The plugs can then be reinserted in inverted position, so that the slots are within the holes and the flat ends are outside. In this position, the index pin cannot engage the slots, so that selective indexing without mistakes is possible.



The flatted end of the index pin engages the slot in the plug. One side of the slot is tapered 5 deg. to match a like taper on one of the flats on the index pin



Register marks in the form of a cross are made in the cylinder by a stylus held in the carriage. The axial mark is made by moving the sliding part of the carriage, and the circumferential mark is made by rotating the cylinder

In making the register marks in the shape of a cross, the circumferential marks are made by rotating the cylinder, and the axial marks are made by moving the part of the carriage holding the stylus by the screw attached to the hand knob, the stylus, of course, being in contact with the cylinder. After each axial movement, the movable part of the carriage is brought back to the initial position, being located by a pin.

In Fig. 2 is shown one of the slotted plugs, the holes for which in both the crossrail and the handwheel are bored in a jig borer for accuracy.

A Recessing Tool for the Turret Lathe

HENRY BAUER

Referring to the article by Don R. Hammitt under the title given above (*AM*—Vol. 78, page 453), we have been using a similar recessing tool with some refinements for several years.

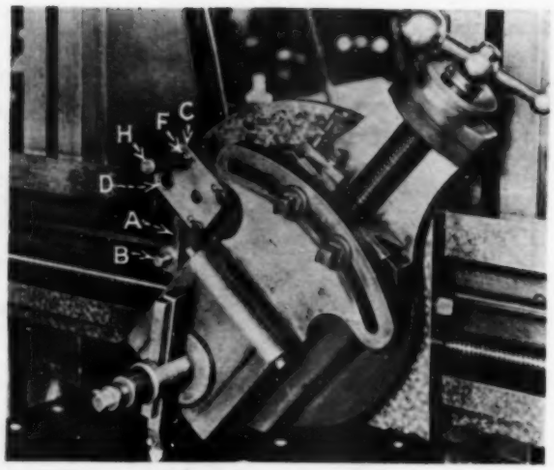
In addition to the stop screw *A* for limiting the depth of the recess, as in Mr. Hammitt's tool, our tool is provided with the stop screw *B*. This prevents the pivoted sector from being pushed back far enough to permit the back of the tool to score the work as the tool enters or leaves the hole. The tool is also provided with the helical pull spring *C* to return the pivoted sector to the starting position when the operating lever is released. Tools having either round or rectangular shanks can be held in the bushings *D* and *F*, respectively.

Setting Planer Heads to Angles

MATTHEW HARRIS

In an article under this title (*AM*—Vol. 79, page 406), Walter S. Klay describes an ingenious device for setting planer heads to angles within the accuracy of a spirit level. However, in some planer heads there is not enough room on the slide above the clapper box for such a device.

Some years ago the Pratt & Whitney Company equipped one of its planers



The head can be accurately set to any angle by inserting gage blocks of the correct size between the pin B and the inner end of plug H.

with a device for setting the head to angles by chordal length, as shown in the illustration. The bracket *A* is attached to the side of the saddle and carries the hardened and ground pin *B*. The bracket *C* is attached to the swiveling member and has two holes at *D* and *F*. Hardened and ground bushings are inserted in these holes and are of the same internal diameter as the outer diameter of pin *B*. The bushings are equidistant from the pivot of the swivel-member, when the swivel is in its normal position.

The location of the brackets is such that when the head is vertical, pin *B* is midway between the holes *D* and *F*, so that with the hardened and ground plug *H* in either of the bushings when the head is vertical, the surface of its inwardly projecting end is a known distance from the surface of pin *B*. This distance is to prevent errors in setting the head vertically caused by dirt or chips on either the pin or the plug preventing their proper contact. To set the head vertically, a gage block is inserted between the plug and the pin, its size being equal to the known distance noted above.

To set the head to a predetermined angle, it is swiveled so that one or more gage blocks can be inserted between the plug and the pin, the total dimension of the gage blocks being equal to the chord of the angle multiplied by the center distance of both the pin and the plug from the pivot of the swiveling member, plus the distance between the plug and the pin when the head is vertical. The head can be set to angles on either side of the vertical by inserting the plug in either one of the bushed holes.

Lacking a table of chords, it should be borne in mind that the chord of any angle is twice the sine of one-half that angle, so that the chord of any angle can be found from a table of sines.

Adjusting Devices for Parts of Combination Press Tools

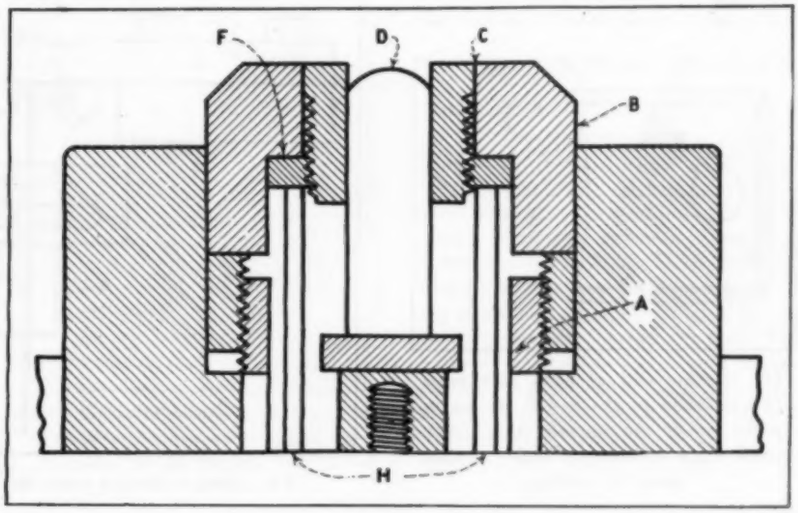
BURNETT MENKIN

When combination press tools are in constant use, it is well known that the blanking cutter needs frequent sharpening, and that in order to reset it to the correct height, washers equal in thickness to the amount of metal removed must be placed under it. When many combination tools are in use, it is quite a nuisance to the repair man to select washers of different thicknesses.

To eliminate the trouble, I designed the adjustable features illustrated. The threaded collars *A* are placed under the blanking cutter *B* and are used to adjust it to the correct height after grinding. At the same time, the drawing-ring ejector *C* was made adjustable so that its correct height in relation to the drawing punch *D* could be maintained. The ejector is threaded and the threaded collar *F* is screwed on it, resting on top of the pressure pins *H*. Slits are cut through the ejector so that it will act as a spring and hold the collar by friction.

Adjusting devices of this type have proved to be quite a saving in both time and money.

After sharpening, the blanking cutter is adjusted for height by threaded collars. The drawing ring ejector is threaded and can be adjusted by a threaded collar resting on the pressure pins



Truing Chucked Work by the Light-Gap Method

O. A. WAGNER

Everyone who has had occasion to true up work held in a chuck or on a faceplate knows the value of an indicator for that purpose, but an indicator is not always available.

Lacking an indicator I use, what I call, the light-gap method. A cutting-off tool is held in the toolpost with the cutting end parallel with the line of centers. A piece of white paper, bright metal or a small mirror is laid on the carriage beneath the work to reflect the light upward. The tool is then brought close to the work and the variation in the light gap is noted as the work is revolved, correcting its location in the usual way.

When variation in the light-gap can no longer be detected by the naked eye, I use a magnifying glass. The stronger the glass the nearer the tool can be brought to the work, making the light-gap narrower, and the more accurately the work can be trued. I always use as small a light-gap as can be clearly seen. With an ordinary reading glass I have trued work to show a variation of as little as 0.0005 in. when an indicator was applied.

Fixture for Machining Radii on Pipe

CHARLES C. TOMNEY
Chief Tool Designer,
Carrier Engineering Corporation

In making our liquid outlet sumps we weld short pieces of 4-in. pipe to the outsides of 12-in. steel shells. To have these pieces fit the outsides of the shells close enough to make a tight joint by welding, it is necessary to machine a 6 3/16-in. radius on each one, as shown at *A* in Fig. 1. Heads are welded in one end of each of the pipes and the holes *B* and *C* are drilled.

The fixture for machining the radii is shown in Fig. 2. It was made to be used either on the faceplate of a lathe or on the table of a vertical boring mill. The holes *A* are for the bolts for attaching it to the lathe faceplate. In using it on the boring mill, clamps at *B* are used to hold it on the table, it being piloted in the center hole. Eight equally spaced V-blocks *C* for holding the work are cast integrally with the base. Because the job was a rough one, it was not considered necessary to finish the V-blocks.

Each clamp *D* for holding the work is hinged, as at *F* and is held down by a hand nut, as at *H*. A coil spring is located under each clamp around the stud, so that when the hand nut is loosened the clamp will automatically raise and release the work. The tapped holes for the studs are counterbored for about 1-in. in depth to allow space for the springs. Steel plates *I* are attached to the V-blocks to hold the adjustable stops *K*. The pins *L* are for locating the work from the drilled hole *B*, Fig. 1. While there are four pins, only three are shown projecting above the clamps, the fourth being flush with the clamp for locating similar work of a different size.

One advantage of this method of holding the work is that double the radius, or the diameter, can be calipered in the usual way since the pieces are in pairs opposite one another.

The floor to floor time for machining the eight pieces is 32 min., or 4 min. per piece.

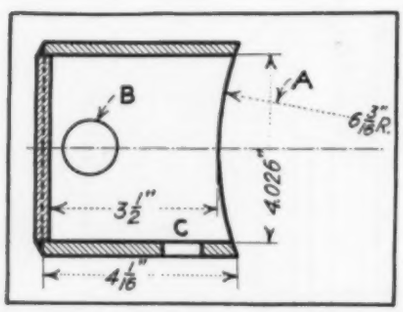


Fig. 1—One end of each pipe must be machined to the radius shown in order to fit the outside of a 12-in. shell close enough to make a tight joint by welding

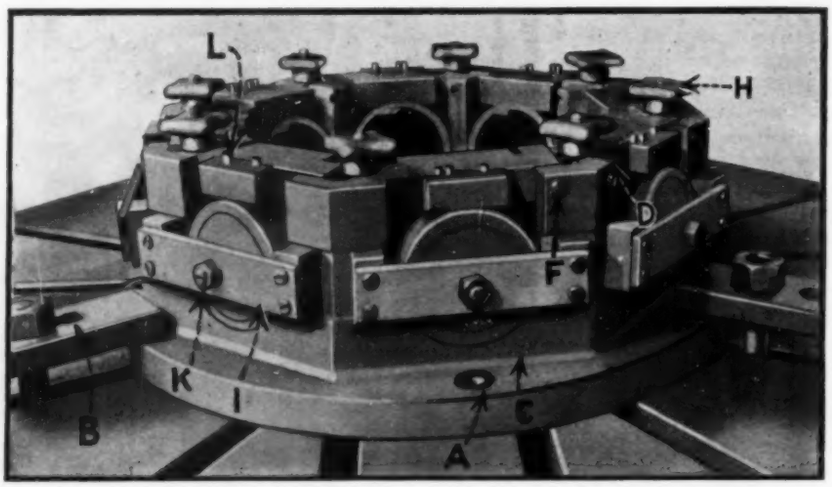


Fig. 2—This fixture holds eight pieces of pipe in V-blocks. The radii are machined on the pipes by boring. The fixture can also be mounted on the faceplate of a lathe

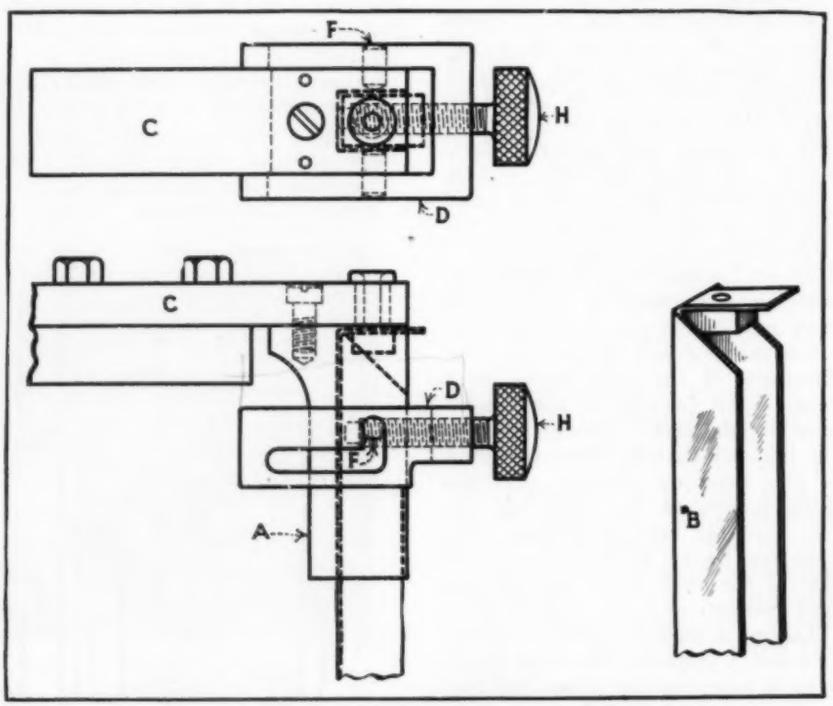
Rapid Clamping Device

PETER L. BUDWITZ

A simple quick-acting clamp that can be applied to many designs of jigs and fixtures is illustrated. It is especially useful where the work to be held is easily distorted and where clamping pressure must be applied in a confined space, thus rendering clamping by ordinary means both difficult and slow.

The workholder *A* is channeled to receive the work *B*, which is shown in the jig in heavy dotted lines. It is attached to the bushing plate *C*, which is clamped near the edge of the drill press table so that the long work can overhang. The clamp *D* is in the form of a yoke and straddles the workholder. It has right angle slots in both legs; these slots are engaged by pins *F* in both sides of the workholder.

In loading the jig, the clamp is pulled out until the pins contact the ends of the horizontal parts of the



The clamp is locked when the pins engage the vertical parts of the slots

slots, thus freeing the end of the clamping screw *H* from the channel in the workholder. The work is put into the channel in the workholder and is pushed up against the bushing plate. The clamp is then pushed in until the vertical parts of the slots drop over the pins, locking the clamp. Clamping is completed by giving the clamping screw a slight turn.

In unloading the jig, the clamping screw is backed out slightly, the clamp is raised until the pins contact the horizontal parts of the slots and is then pulled outward, freeing the work.

Piloted Boring Bars for Turret Lathes

EDWARD GREENSPON

The piloted boring bar illustrated in Fig. 1 is economical and satisfactory for short run jobs, or where the pilot bushing in the chuck or fixture is of the revolving type. It can be used alone or in connection with overhead or turret-slide piloting. It holds the size and roundness of the hole more closely than does the plain bar, and for a given length or cross-section it is more rigid and less likely to develop chatter. It can have more than one cutter, in which case it is usually designed to suit an individual job and is assigned a tool number or other means of identification, whereas if it has but one cutter it is a general purpose tool.

For long run jobs, where pilot bushings are screwed or pressed in the chuck or fixtures are used to support the pilot, the roller pilot illustrated in Fig. 2 is much to be preferred, especially for machining cast iron dry.

Roller pilots can be further improved and their lives greatly lengthened by the use of needle-roller bearings, as shown in Fig. 3. Ball bearings can also be used where space permits. An item that is often overlooked in the design of roller pilots is the necessity for adequate lubrication, especially where the work revolves at high speed. Note that in the pilots in Figs. 2 and 3, provision has been made for lubricating the rollers.

There are several types of commercial boring bars, one of which has small rectangular toolbits mounted in a cutter block which, in turn, fits in a suitable slot in the bar. The cutter block can be removed from the bar so that the toolbits can be ground and reset to size independently. More than one cutter block can be provided for the same bar, thus reducing lost time in replacing cutters to a simple operation of slipping out the block having dull toolbits and replacing it with one in which the toolbits are sharp.

Commercial boring bars are now being made in such a broad range of sizes and types that one can usually find something suitable for the job in hand by looking over the maker's catalogs. In most cases the prices compare favorably with the cost of making bars to fit the jobs, and it seems a mystery why the commercial product is not used more extensively.

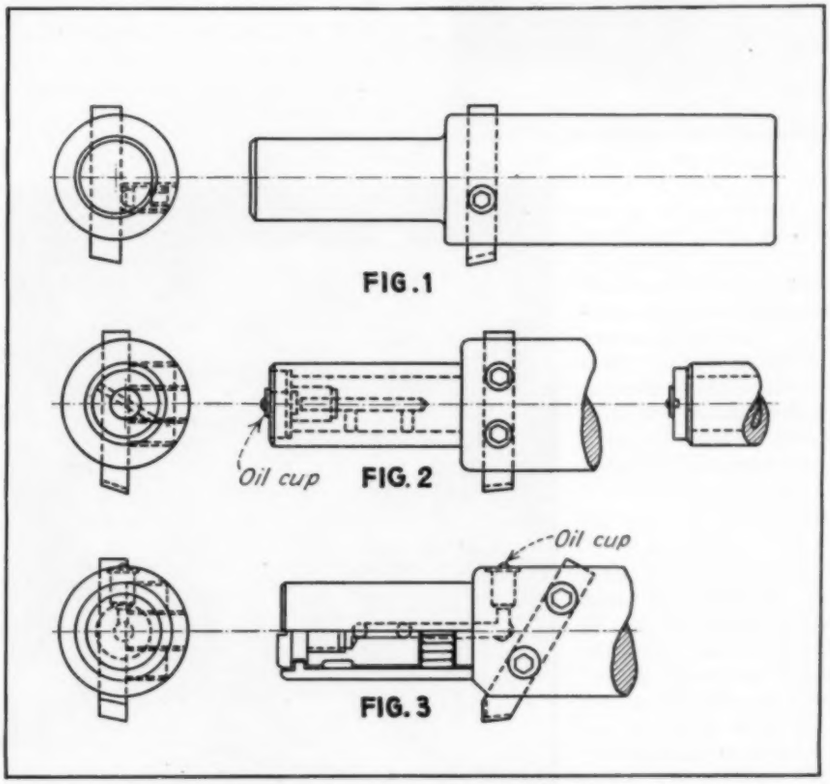


Fig. 1—Bars having plain pilots are used where the pilot bushings in the fixtures are of the revolving type. Figs. 2 and 3—Bars having roller pilots are used where the pilot bushings are stationary in the fixtures

SEEN and HEARD

John R. Godfrey

K-Monel

Here's more trouble for the shop man. More for him to learn about a new metal that the boss may dump on his machine almost any day. It's known as K-Monel, and ranges from 225 to well over 325 Brinell, depending on the grade. Its high tensile strength makes it attractive to designers. But if the drawing calls for the D, or hardest grade, the shop will have to use carbide tools or finish by grinding. Metals seem to be just one thing after another these days.

Utilizing Reflected Light

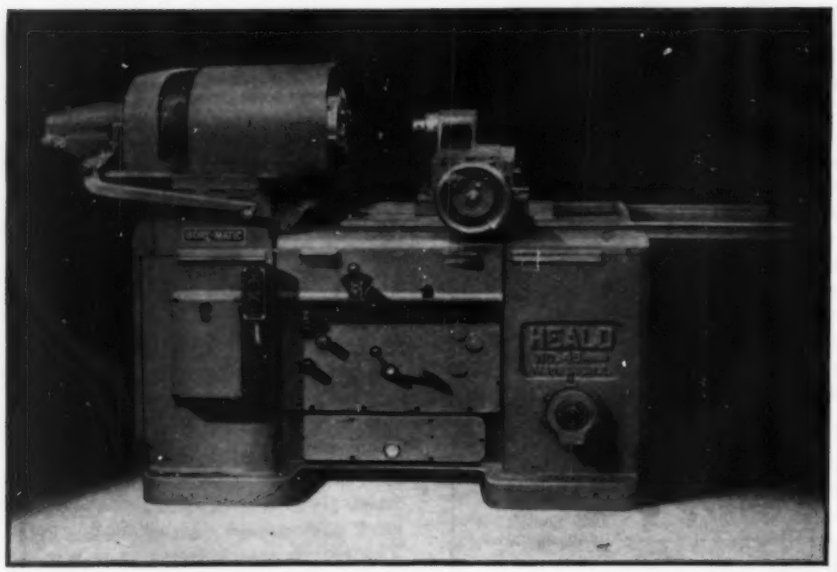
A school shop discovered that it seldom needed electric lights on Saturday, when there was no school. On other week days it used a lot of electric light. The reason was because the students parked their cars just outside the machine shop windows. While the cars cut off only a small amount of window space, they prevented reflection of sunlight from the white sand that covered the ground. The cars were moved back 125 ft. to a parking line and the light bill dropped 50 per cent. The boiler house and black iron stack were painted with aluminum paint and the light bill took another drop.

Cadmium Plated Drill Jigs

A number of small drill jigs recently attracted my attention as I entered a toolroom. They had an almost galvanized finish as though they had been sand blasted or sprayed with aluminum paint. Inquiry revealed that both guesses were wrong. They had been dipped in a cadium plating bath. During a spell of damp weather they had accumulated rust spots, so they were cleaned and plated to prevent further trouble. They were very attractive and plants with cadmium plating outfits may be tempted to do a little experimenting along this line.

Shop Equipment NEWS

Heald Boring Machines



The Style No. 49 single-end universal Bore-Matic, recently introduced by the Heald Machine Co., Worcester, Mass., is particularly suitable for small lot production of a variety of work such as may be found in a machine tool shop. It is equipped with a manually operated drawbar operating unit, by which chucks and collets can be actuated when they are used with the flange-type spindle workheads. A manually operated cross-slide is mounted on the table for either work fixtures or toolholders. With this arrangement the work may be held in a rotating chuck or a stationary fixture on the table, and the cutting tool may be of either the rotating or stationary type.

A single bridge has a swivel plate upon which is mounted the single boring head. While the mass of the machine alone would absorb practically all normal vibration, care has been taken in the design of its various units to prevent the slightest vibration being transmitted to the boring spindle. This includes vibration dampeners under the pump motor and flexible connection between the pump and the hydraulic system. Design of the base insures even distribution of weight, which, in conjunction with properly placed ribs, absorbs vibration.

Wide V- and flat-ways for the table extend nearly the entire length of the base and are lubricated by a constant flow of oil under metered pressure from the oil reservoir. All electric controls, including a fusible disconnect switch, are mounted in one cabinet cast in the left end of the base with interlocked switch cover. Hydraulic control box is built up of separate units and therefore is readily changeable for various operating cycles, without disturbing any piping.

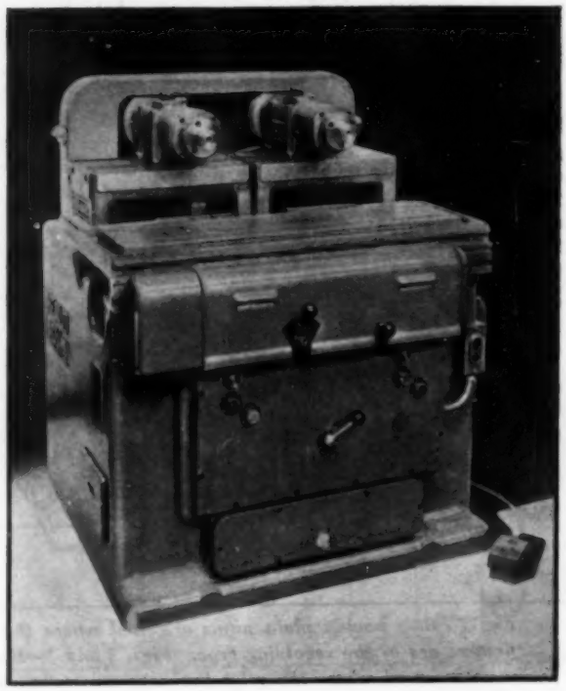
The No. 44 Bore-Matic is different from other Heald Bore-Matics in which the boring heads are usually at right angles to the table travel. Although designed particularly for facing and grooving operations, it may be adapted to various arrangements of work where the surfaces to be bored are not parallel to each other.

Simple in operation, the machine may be furnished with completely automatic cycles. Each element of the cycle is controlled for maximum output, and feeds and speed may be easily varied.

With automatic control of the table in both directions, it is possible to perform a different set of operations with each movement of the table. In grooving pistons, the tools are mounted on the table and the work on the boring

Above — Care has been taken to minimize vibration in the No. 49 single-end boring machine which is particularly adapted to small lot production of a variety of work found in machine tool shops

Right — Designed particularly for facing and grooving operations, the No. 44 Bore-Matic may also be arranged for various adaptations, including the boring of surfaces which are not parallel to each other



heads located on the bridges at the rear of the machine. Grooves are roughed as the table feeds in one direction and finished as the table moves in the other direction with a reverse feed. Upon completion of the finish grooving, the table returns to mid-position for the loading and unloading of the work.

The table is driven hydraulically, assuring uniform feeding and providing complete control and an infinite selection of speeds up to the maximum provided.

In the base are mounted two motors, one driving the rear boring heads and the other driving the oil pump for the hydraulic system. Both motors are mounted on vibration dampeners, thus reducing any possible vibration. Drive to the boring heads is through V-belts. Boring head motor is started and stopped by means of electric limit switches operated automatically, the stopping being accomplished by means of a solenoid brake directly mounted on the motor. Boring heads are of the Red Head design.

Niagara No. A-1 ¾ Inclinable Press

In the No. A-1 ¾ press, announced by the Niagara Machine & Tool Works, Buffalo, N. Y., there is used a one-piece, high tensile, cast-iron frame, resulting in not only a high factor of safety in regard to strength, but rigidity and resistance to vertical, horizontal and torsional stresses.

This press is equipped with the Niagara fourteen-point engagement sleeve clutch, which eliminates time lag between the depression of the treadle and the actual clutch engagement, resulting in safety for the operator and high productive output. The fourteen engaging jaws distribute the load over a striking surface having many times the usual area. Application of the driving force at fourteen points arranged concentrically around the shaft eliminates transmitting the stress of engagement and load to the clutch wheel bearing, thereby permitting the use of anti-friction bearings in the flywheel or main gear.

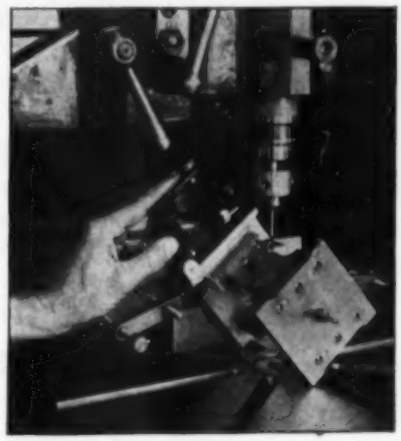
Driving energy is transmitted to the shaft by 26 internal, involute splines generated on the inside of the clutch sleeve. To prevent excessive forward drift of the shaft if the brake should be too loosely adjusted, and to eliminate the possibility of repeating as a result, the throwout spindle encounters an abutment machined in the clutch sleeve which positively stops the shaft at the limit of allowable drift. A positive locking device is built in the throwout to prevent accidental engagement of the clutch. A single-stroke, non-repeat device is provided.

Double-adjustable V-gibs on each side of the slide are designed for rigidity, to match the gib seat mounting in the frame, and to match the rigidity of the slide, as well as to provide adequate bearing surface and maintain a true bearing under heavy loads.

The slide is equipped with the Niagara "Breech Block" die clamp providing solid support for the die under pressure. It is cylindrical in shape and ground to close limits to eliminate vertical play.

A ball-bearing idler for flat-belt drives provides automatic compensation for stretch of the belt. An easily adjusted inclining device is provided to tilt the press in the desired working position. The 1¾-in. diameter, forged, turned and ground shaft has a 3¼ in. eccentric. The shaft runs in bearings which are split at an angle of 45 deg. from the vertical. Thrust is transmitted direct to the frame instead of partly to bolted caps.

The brake is equipped with a spring which automatically compensates for expansion due to heat of operation as well as for wear.

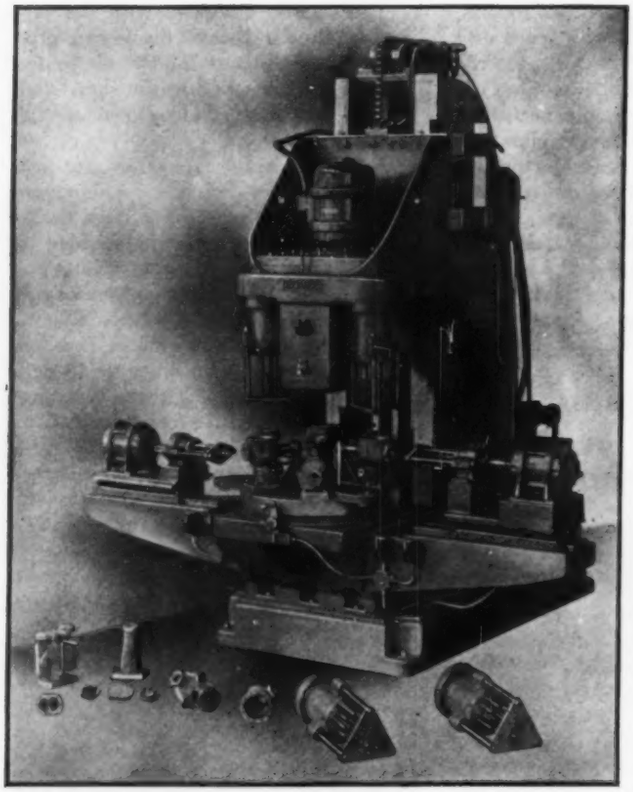


Bausch & Lomb Optical Protractor

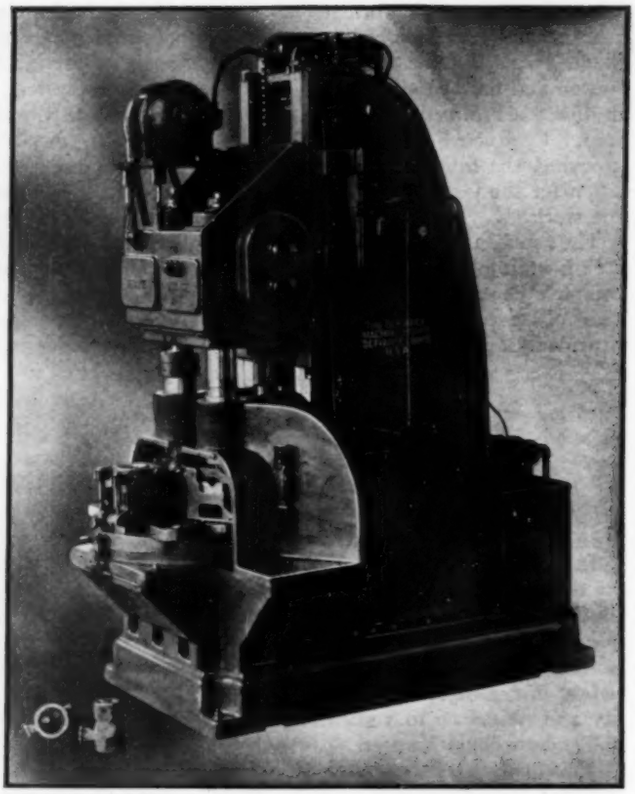
Intended for use in setting up work on jig boring, milling, drilling, grinding, planing and shaping machines, the optical protractor, announced by the Bausch & Lomb Optical Co., Rochester, N. Y., measures angles to one minute of arc. Readings are taken directly off the scale, thereby eliminating mathematical calculations or reference tables.

The instrument is built upon an adjustable base, and the ring center revolves, carrying with it a level vial and protractor scale equipped with a vernier scale.

Adjustable base makes it possible to correct the protractor for any inaccuracy from the true level in the bed of the machine. After truing the base, the center ring is revolved by hand, or by micrometer screw, until the required angle appears on the scale. The protractor is then placed upon the work which is turned until the level bubble becomes central.



This 58-spindle machine drills and countersinks holes in top, bottom and side flanges of compressor housings



Compressor housing bottoms are rough and finish bored and faced on this two-spindle boring and facing machine

Defiance Multi-Head Machines for Compressor Operations

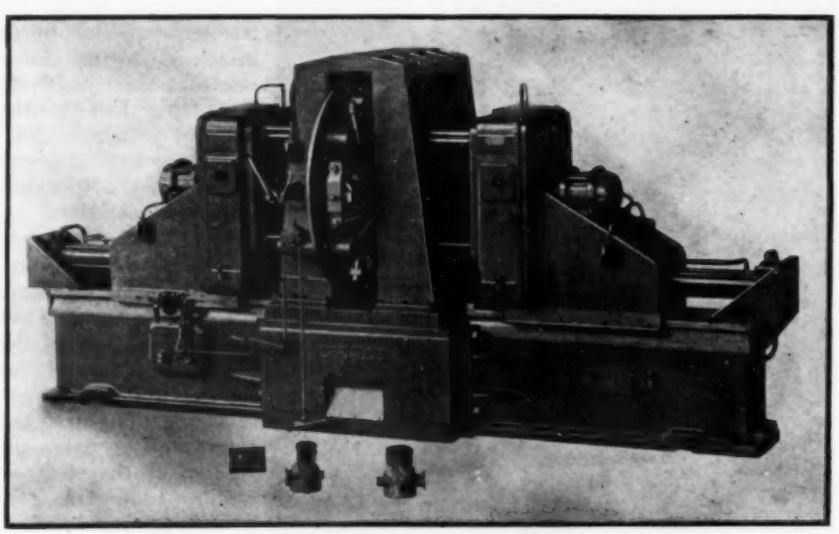
The Defiance Machine Works, Defiance, Ohio, has furnished six machines designed for performing the various machining operations on air compressors for household refrigerators.

A vertical 58-spindle drilling and countersinking machine drills and countersinks the holes in the top, bottom and side flange of the compressor housings. The column has long slides which carry the cluster drive head to which the multiple-spindle heads are mounted. It supports the hydraulic-feed cylinder and also incloses the weights that counterbalance the head. A horizontal fixture pedestal is made with two wings that carry the slides on which the two side heads are mounted.

Drive box is fully inclosed and has force-feed lubrication. Multiple-spindle heads can be removed and other heads put on for drilling castings with different centers. The machine illustrated has four vertical, multiple-spindle heads which drill 24 holes and countersink 22 holes in the top and bottom of the casting. Two side heads drill and countersink six holes in the side flange of the casting. Adjustable collets are used in the spindles wherever centers permit.

This machine is fitted with a 30-in., three-station, hand-operated indexing table with two fixtures at each station for clamping the housing in position. The pilot bar attached to the vertical head enters the bushing on the table before the tools strike the work, and thereby locks the table in its proper position. Removable-type jig bushings are furnished for the drills. Guide bars, which slide on the cluster heads, support the bushing plate.

Hydraulic feed can be regulated to suit requirements. Each head is equipped with a cut steel rack and



Port hole bosses are drilled, countersunk, counterbored and rough and finish faced on this two-way opposed ten-spindle machine

pinion for synchronizing. The feed cycle of the machine is automatic; rapid traverse of drills to work, feed through the cut and rapid reverse to stop. Production capacity of this machine is 76 castings per hour. Floor space occupied is 96 in. long, 108 in. wide. Height is 116 in. Net weight, 18,900 lb.

A variation of this machine is a vertical eight-spindle drilling and boring machine, designed for core drilling, rough and finish boring of the cylinder bores and drilling the 3/8-in. hole in the top of the compressor housings. This machine is fitted with an 8-station, 36-in. circular, hand-indexing table. Aside from the tooling set-up, this machine and the former machine are similar in construction and operation. Production capacity of this machine is 60 castings per hour.

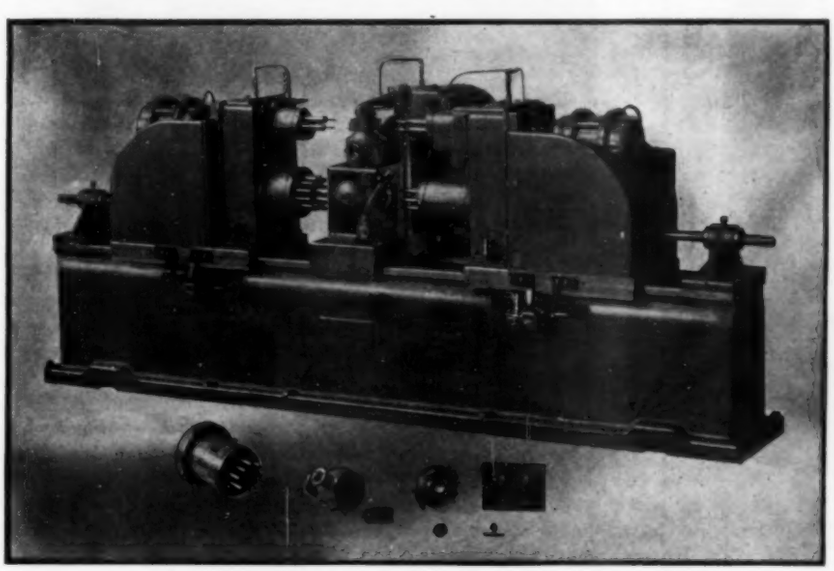
The company's two-spindle vertical boring and facing machine, designed for rough and finish boring, and facing the bottom of the compressor housing is a heavy-duty machine. A fixed center head is arranged for Texrope drive. The three-station, 30-in. circular hand-indexing table is fitted with fixtures for positioning and clamping the compressor housing at each station. Fixtures on this machine are of the two-jaw, self-centering chuck type. Eighty castings are completed per hour on this machine.

The horizontal, two-way-opposed, ten-spindle drilling and facing machine, illustrated, has been designed for drilling, countersinking, counterboring, rough and finish facing of the boss for port holes on the compressor housings. The heavy base has one center member, to which two separate members are attached. These carry the slides on which the heads and motors are mounted. Each of the two heads has five spindles.

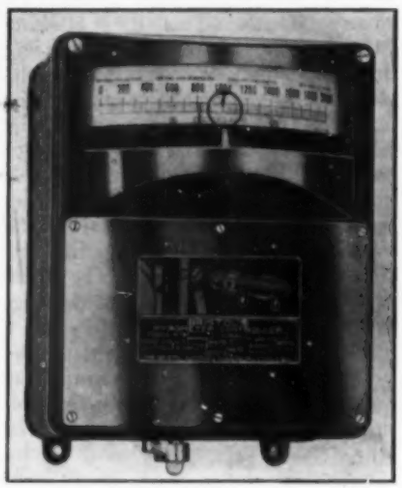
This machine is equipped with a hand-operated, five-station trunnion-type fixture that is mounted on the center member of the base. Adapters and clamps are fastened to this fixture. The trunnion is mounted between heavy housings on large diameter Timken bearings. Hydraulic feed cycle of the machine is automatic. Capacity is 68 castings per hour.

Similar in operation and construction to the previous machine, the company's horizontal seven-spindle, two-way boring and facing machine is designed for rough, semi-finish and finish boring, rough and finish facing and line reaming of the crankshaft bore of the compressor housing. An auxiliary head which is independent of the other heads is mounted on the trunnion pedestal for line reaming.

All holes in the top, bottom and sides of the compressor housings are tapped on the company's horizontal 33-spindle, three-way tapping machine. The base consists of one front member, to which the rear member is attached. These carry the slides on which the heads and motors are mounted. Heads are arranged for direct-motor drive. Multiple-spindle cluster heads on this machine can be removed and other heads put on for tapping castings with different centers. The right-hand head taps fourteen 7/8-in. holes, the left-hand head taps twelve 7/8-in. holes, and the rear head taps six 1/4-in. holes and one 7/8-in. hole. The machine is shown equipped with a two-deck fixture, which is mounted on the frame of the machine. A casting is loaded in the fixture twice and thereafter at every cycle of the machine a casting will be completely tapped. The machine is equipped with a screw feed and is driven direct from the drivebox of each head.



A compressor housing is completely tapped at every cycle of this horizontal, 33-spindle, three-way machine



Bristol Pyrometer Controller

The pyrometer controller produced by the Bristol Co., Waterbury, Conn., is intended for industrial purposes and temperatures up to 3,000 F. It has no open contacts, mercury switches being used. Mechanically operated switches give maintained contacts on multiple-circuit control as well as on single-circuit control. Intermittent contact can be provided. The controller is rated at 25 amp. at 125 volts, for single circuit on-and-off control, 15 amp. for two-circuit control and 5 amp. for three-circuit control.

Motor, mercury switches and terminal blocks are located in a separate compartment. This arrangement simplifies inspection and permits the work of installation or replacement of parts to be carried out without exposing the movement to dirt or fumes. There is no danger of throwing the control mechanism out of adjustment, and spilled mercury cannot get into the movement should a mercury switch break in shipment.

A safety latch below the instrument prevents accidental shifting of the adjusting knob and automatically lowers the control platform to prevent damage to the pointer while changing the control point. There is no strain on the instrument pointer. Only a slight touch of selector lever selects control position, while an independent set of switch levers, actuated by the motor, does the actual shifting of switches. Dimensions are: Width 9 in.; height, 11 in.; depth, 9 in.

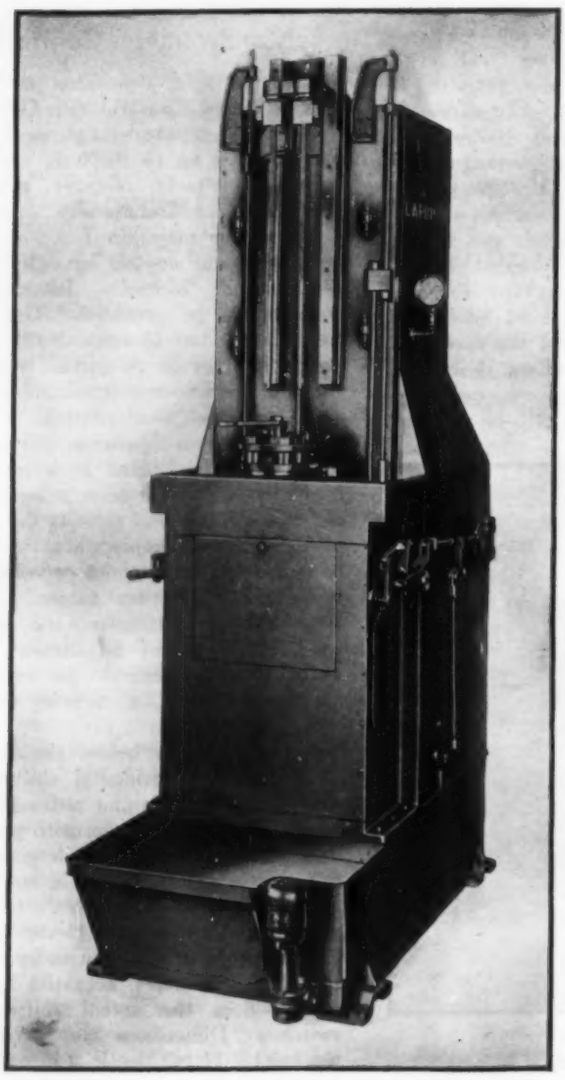
La Pointe Vertical Hydraulic Broaching Machine

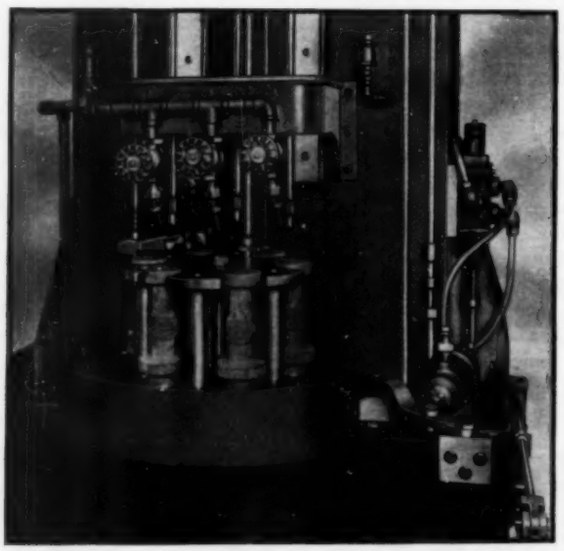
Being designed to pull the broach through the work, the vertical broaching machine, announced by the La Pointe Machine Tool Co., Hudson, Mass., sets up no difficulty in getting an ample supply of coolant to the cutting edge of the broach teeth. It also simplifies fixture mounting and the handling of work. The castings are of semi-steel; ways are hardened and ground steel adjustable to take up wear. Main slide to which the broaches are attached during the cutting stroke is 80 in. long. The width of the slide for mounting pull bushings is 18 in.

West hydraulic pumps used on the vertical broaching machines are of the variable-delivery type. Both the volume and direction of flow can be varied or changed without shock. Because of its variable and reversible discharge, it may be rotated in one direction, irrespective of either volume or direction of flow. Reversals of flow of oil may be accomplished as fast as the operator can move the operating lever. The case is completely filled with oil at all times, and is connected to the oil supply in the base of the machine. When there is no load on the pistons the oil confined in the cylinder prevents movement of the pistons in either direction and also holds the main bearings in place.

Both pedal and lever are provided for operating the broach lift slide. Lever only is provided for operating the main slide. In starting the cycle with the broach in place, the operator first depresses the pedal which carries the broaches downward through the work. The shank of the broach engages in an automatic pull bushing attached to the main slide. He then, by means of a hand lever, starts the main slide on its downward stroke. The upper slide follows the broach down to a pre-determined distance from the work and releases automatically. The main ram continues on until the broaches are all the way through the work. The operator then reverses the travel of the main slide which carries the broach upward until the upper end engages in automatic pull bushings on the upper slide. The upper slide then carries the broaches to their upward position and stops while the main slide continues up until it gets to the end of the stroke.

This vertical pull type broaching machine is manufactured in three sizes: 10, 15 and 25 ton capacities. Maximum overall length of broach that can be used ranges from 42 to 60 in.

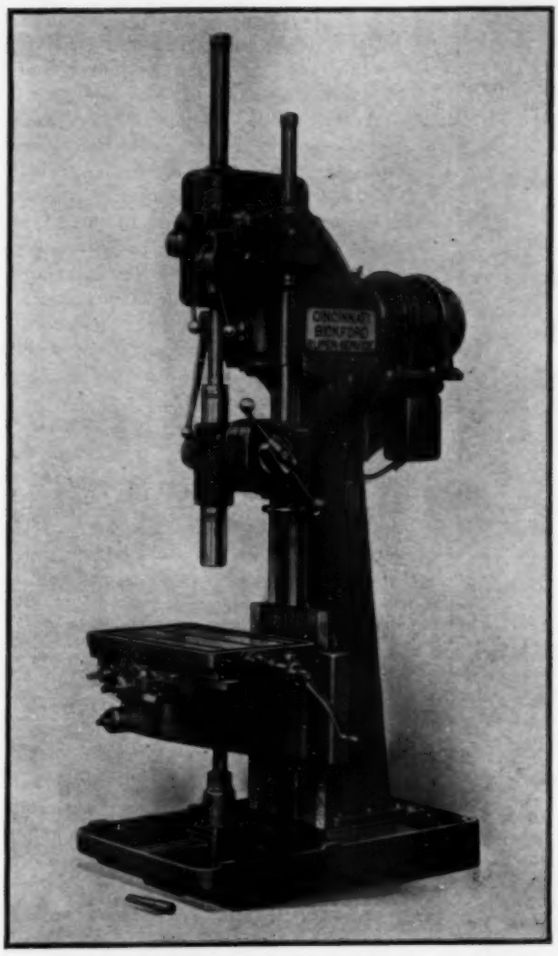




Above—A six-station index fixture mounted on a 25-ton capacity V-3½ broaching machine. Three operations are required to finish each part. The parts are steel forgings for automobile transmission countershaft gears. Three broaches are removing 0.200 in. stock from a rough pierced hole. Production is 130 parts per hour, running at a cutting speed of 15 ft. per minute. The fixture is indexed automatically at each end of the stroke

Left—Speed of the ram is controlled by the speed adjusters on the side of the machine. These adjusters provide an infinite range of speed from 10 ft. per minute up to the maximum speed. Cutting and return speed may be changed independent of one another. These machines are available in 10-, 15- and 25-ton capacities

Cincinnati Bickford Upright Drills



"Super Service" Upright Drill fitted with a compound table (optional equipment) for layout work

The Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio, has announced an improved line of 21- and 24-in. upright drilling machines, known as "Super Service" upright drills. In addition to the 21- and 24-in. machines, the company has introduced a 28-in. drill, incorporating the same features as the rest of the line. A feature of these machines is the use of a reversing motor for tapping instead of the mechanical reversing clutches. The lever at the left of the head operates a built-in pushbutton, controlling the forward and reverse rotation and the stopping of the spindle. A standard constant-speed motor having low-starting current, high-torque characteristics, suitable for about 20 reversals per min., is used with a magnetic reversing starter. The initial drive from the motor on the 24- and 28-in. machines is through hardened spiral bevel gears.

These machines are built with either round or box columns. The 24- and 28-in. uprights provide twelve speeds in ranges from 60 to 1,000 r.p.m. or 90 to 1,500 r.p.m., and nine rates of power feeds. The 21-in. size provides nine speeds in any one of five optional ranges, and four rates of power feeds. All speed and feed changes are controlled by a single lever fitted with direct-reading plate, so that the selection of any desired speed and feed can be made quickly.

In all Super Service upright drills the spindle is anti-friction bearing mounted. Spindle sleeve diameter has been increased to 4 in. on the 24- and 28-in. machines and to 2⅞ in. on the 21-in. machine. Spindle and sleeve are made of chrome-nickel steel, the spindle sleeve having rack teeth cut integral. Possibility of damage to the rack and pinion has been eliminated by a spring bumper which cushions the spindle return. Spindle sleeve bearing in the head and the length of the head bearing on the column has been increased.

The feed gearing is now mounted on anti-friction bearings. Table on the box column machine is fitted with an adjustable taper gib and has an adjustable screw support under the center of the table. Housing of the box column machine is now one piece.

A compound table may be obtained as a special feature. It is most efficient for layout work in the toolroom and elsewhere when limits of accuracy are no less than plus or minus 0.001 in. Compound table is available only on the 24- and 28-in. box column machines.

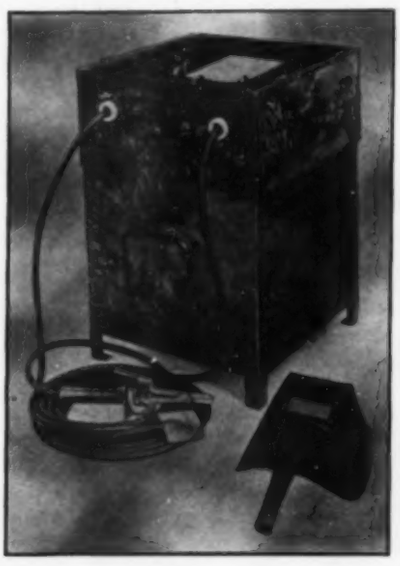
These machines can be furnished to suit individual requirements in the nature of multiple drill heads, flanged spindle sleeve, auxiliary guide for rigid drill head mounting, automatic spindle return and gang drill arrangements.

Linde Stainless Steel Welding Rod

The Oxweld No. 28 columbium-treated 18-8 welding rod, announced by the Linde Air Products Co., 205 E. 42nd St., New York, N. Y., simplifies the fabrication of products from 18-8 stainless steel and improves the corrosion resistance of the fabricated joint. The feature of this rod is the inclusion of a definite quantity of the element columbium. No heat-treatment after welding is necessary, because products fabricated with the Oxweld rod have full corrosion and heat resistant qualities in the "as-welded" condition. Use of this rod requires no special technique.

Miller Arc Welders

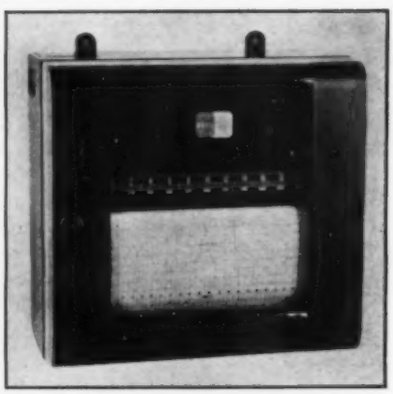
Designed for welding light-weight metals, down to 27 gage steels, with current from 15 to 275 amperes, the arc welders announced by the Miller Electric Mfg. Co., Inc., Appleton, Wis., are especially adaptable for applications such as on automobile body steels and in garages and machine shops. It is made in three sizes: 15 to 150 amp., which handles 1/32- to 5/32-in. rod; 15 to 275 amp., which handles 1/32- to 1/4-in. rod and the "Junior Welder," 15 to 90 amp. for small power service. These welders operate on 220 volts, 60 cycles, single-phase. Directional flow of metal makes possible side or overhead welding. There is no electrical connection between the power output and the welding leads. No special wiring installation is required for operation. Welding tongs are made of material that does not burn out.



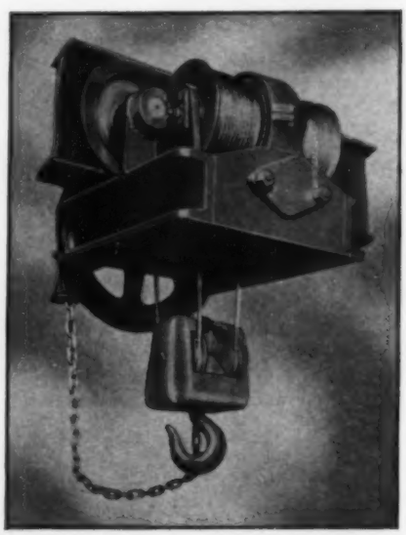
Mobile X-Ray Equipment

The General Electric Co., Schenectady, N. Y., has furnished to a large manufacturer of welded and forged pressure vessels a G.E. X-ray unit, Model KXC-1, mounted on a truck manufactured by the Baker-Raulang Co., for inspection of the welds. Although this X-ray equipment operates at 300,000 volts and 10 milliamperes, it is safe against electric shock due to the fact that the maximum voltage outside of the sealed and grounded head is 220 volts in the insulated cable from the mains. X-ray tube head is practically universally adjustable to facilitate positioning. Exposure time is automatically controlled by a magnetically operated shutter and the machine is capable of producing radiographs of Class 1 pressure vessels of 4-in. rolled steel.

Motive power of the Baker truck upon which this equipment is mounted is used only to carry it the full length of the vessel being examined. Due to the roughness of the floors and in view of affording the maximum protection to the X-ray apparatus itself, the entire equipment and truck are carried from one job to another by means of an overhead crane. The truck has a wheelbase of 116⅝ in. and a platform 138 in. long by 60 in. wide. The main frame is composed of two 8-in. nickel steel I-beams with cross members of the same material which keeps the deflection within the desired limits. A five-speed controller provides accurate control of truck speed.



Mechanism swings out, making all parts accessible for inspection and service



Tail chains, which might entangle and foul the load, are eliminated

Bristol Wide-Strip Potentiometer Pyrometer

Available in single-record, multiple-record and recorder-controller types, the "Wide-Strip" pyrometer, announced by the Bristol Co., Waterbury, Conn., operates on the potentiometer principle of temperature measurement.

A stainless-steel leadscrew, operated by an electric motor under the direction of two galvanometer-controlled contacts, adjusts the slide-wire contact and recording-pen unit to maintain emf. balance in the potentiometer system. The design of the balancing mechanism is such that all mechanical backlash is taken up, making it possible to magnify scarcely perceptible deflections of the galvanometer pointer. Deflections smaller than 0.0001 in. are easily measured.

Slide-wire contact and recording pen are mounted on the same carriage. This eliminates linkages and other types of intervening connections. The carriage, on which is mounted the slide wire contact and recording pen runs on four wheels over a two-rail track. Leadscrew is positively driven by an induction motor. There are no friction clutches or ratchet mechanisms.

The Wide-Strip pyrometer records on a 12-in. chart and is equipped with a 1¼-in. indicating scale that can be easily read at a distance. It is housed in a case which is moisture, fume, and dustproof.

Shaw-Box Hand-Operated Hoist

Designed to operate where headroom is limited, the Type "WR" hand operated hoist, announced by the Shaw-Box Crane & Hoist Co., Inc., Muskegon, Mich., provides an exceptionally high hook lift. It is built in capacities of ½, 1 and 2 tons and is usually used in connection with an overhead I-beam track or single girder crane.

Frame is made entirely of steel members arc-welded together to form a rigid one-piece unit. Trolley is built integral with the hoist frame and is equipped with single flanged wheels which rotate on radial thrust ball bearings. Trolley traverse is accomplished by pushing on the load. Load is raised or lowered by pulling on an endless hand chain which drives the winding drum through a self-locking worm-gear reduction unit. This unit performs the same function as a mechanical load brake.

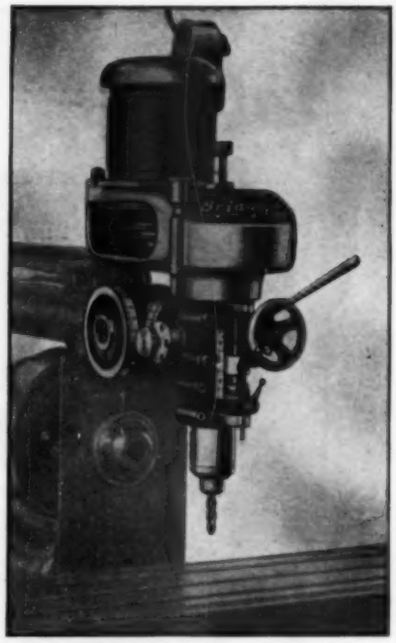
A large flanged drum, grooved to receive the cable, and steel cable is used to accomplish the lift instead of the usual sprocket wheel and chain.

Bridgeport Attachment for Milling, Drilling and Boring

One of the chief advantages of the high-speed milling, drilling and boring attachment, announced by the Bridgeport Pattern and Model Works, 52 Remer St., Bridgeport, Conn., is the fact that all operations can be performed at all angles without changing the set-up of the work. This attachment is adapted to all types of milling machines, including the rectangular overarm style, and was developed chiefly for die-sinking, jig and fixture, and general toolroom use, but may also be adapted to a variety of manufacturing jobs.

It is shown mounted on the front face of a standard dual adapter which gives rigidity when in this position. When compound angles are desired the side mounting is used.

Spindle speeds of 275, 425, 700, 1,050, 2,100 and 4,250 r.p.m. give the attachment a wide range. Spindle is heat-treated, ground and machined to take No. 2 Morse taper. The quill is treated with a chromium process, giving it high surface hardness. Take-up is provided for by a solid shim running the total length of the housing. Micrometer depth stop, graduated in thousandths, is provided. Feed for drilling and boring is through a rack and worm. Drive is by 1/3-hp., 1,150-r.p.m. motor. Quill travel is 3½ in.



Lincoln Motor Starter

A line of automatic motor starters is announced by the Lincoln Electric Co., Cleveland, Ohio. A red stop button extends around and beyond the green start button. Consequently, a bump or fall against the control would move only the stop button. Full advantage of the motor's capacity is permitted by inverse time-limit protection. Immediate motor starting upon resumption of current is insured by low-voltage release, two wire control.

These starters are furnished in three types for different horsepowers and 110, 220, 440 and 550 volts. The XLA starter is for 3- and 5-hp. motors, 110 volts; also 3, 5, 7½ and 10 hp., 220, 440 and 550 volts. The XLB starter is for 7½ and 10 hp., 110 volts; 15, 20, 25 and 30 hp., 220 volts; 15, 20 and 25 hp., 440 volts; 15 and 20 hp., 550 volts. The XLBB is for 30 hp., 440 volts; 25 and 30 hp., 550 volts.

Mechanical moving parts are protected against rust by cadmium plating. Cushion action reduces wear.

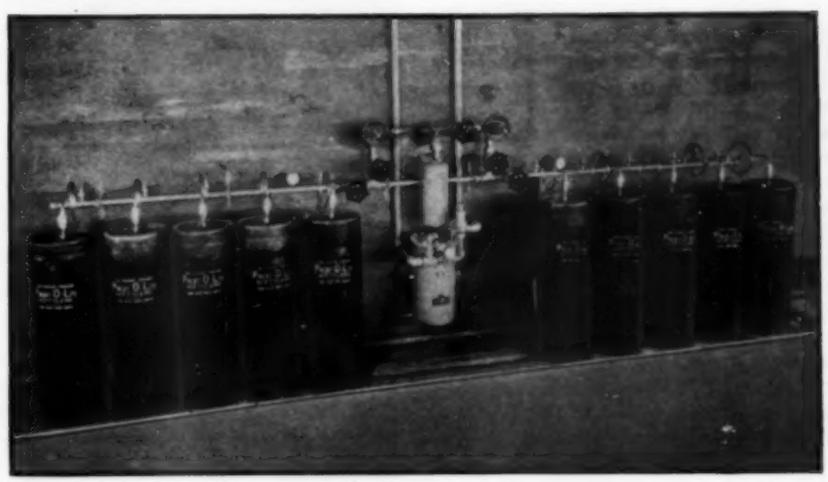
Linde Manifold for Acetylene Cylinders

Available in a ten-cylinder unit, to which extensions in units of five or ten cylinders can be made, the wall type acetylene cylinder manifold, Oxweld Type M-8, announced by the Linde Air Products Co., 30 E. 42nd St., New York, N. Y., consists of two high-pressure header units. These feed into a central regulation system which delivers acetylene to the distribution piping system at pressures up to 15 lb. per sq.in.

Header unit assemblies are composed of heavy seamless steel tubing with forged steel union connections having stainless steel seat inserts. Connections from the header valves to the cylinder valves are made with flexible leads. Each is coiled to provide sufficient flexibility, fitted with an approved Prest-O-Lite flash arrester and is provided with a ball-check valve at the header end. This guards against the possibility of acetylene from the header being driven back into the exhausted cylinder.

The two high-pressure header assemblies are connected by forged steel unions to a central system of six valves and two regulators for controlling the operation of the manifold. These regulators have been designed for heavy-duty service, and will handle a wide variation in load with little effect on the delivery pressure.

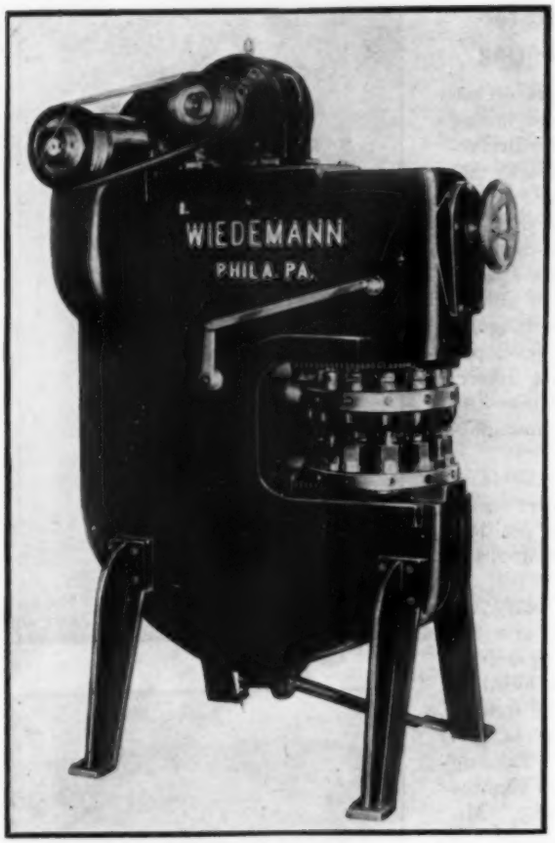
Pressure in each header is indicated on Oxweld high-pressure acetylene gages located on the headers near the union connections to the regulator assembly. A low-pressure gage attached to the outlet of the hydraulic back-pressure valve indicates the delivery pressure to the shop piping system. The manifold should be installed in accordance with the Regulations of the National Board of Fire Underwriters.



Wiedemann Type R-5 Heavy-Duty Turret Punches

The heavy-duty turret punches, Type R-5, announced by the Wiedemann Machine Co., 1815-31 Sedgley Ave., Philadelphia, Pa., will punch 1-in. holes in ½-in. mild steel plate. The machine has a one-piece Meehanite frame proportioned for the rated capacity of 80,000 lb. Drive is by a 3-hp., 1200-r.p.m. motor through V-belts and ground worm and wormwheel inclosed and running in oil. A double-face jaw clutch is pedal-controlled and interlocked with the turret locking lever. Clutch control parts are separately inclosed in oil, will not repeat and will allow the ram to be brought down by handwheel for spot punches. The clutch cannot be operated unless the turret is properly indexed and locked.

Turrets, upper and lower, are bored on a Swiss jig borer and have tapered index holes with large diameter index pins, having a bearing at each end integral with the frame. The turrets are indexed by hand. Punch holders have an automatic take-up for wear in the key and positive location for square or other shaped punches. They are readily removable. Dies are located on the lower turret in separate die-holders, bolted to the face of the turret with independent location adjustment. Each die holder is plainly marked with the diameter of the punch and the corresponding maximum thickness of sheet that should be punched. Specifications: Clearance between dies and strippers, ⅝ in.; stroke of machine, ⅞ in.; strokes per minute, 60; speed of flywheel, 840 r.p.m.

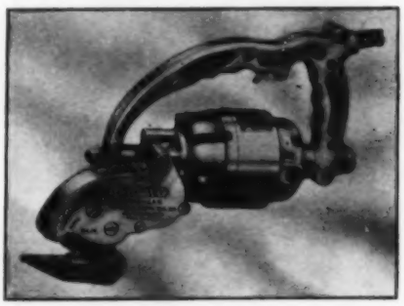


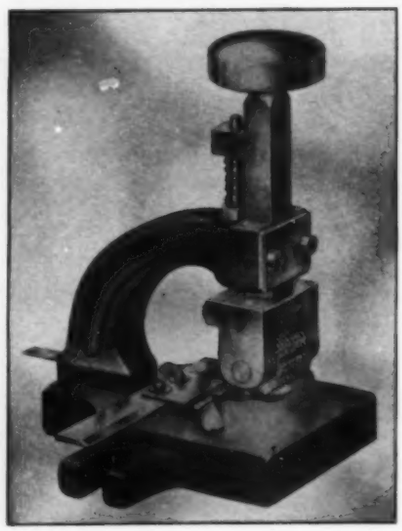
Capable of punching 1-in. holes in ½-in. mild steel plate, the Type R-5 turret punch can be supplied with special tools, for work on stainless steel and copper, and deeper throat, 18-in. throat depth being standard

"Numberall" Stamp

Intended for use on all metals, excluding hardened and tempered steels, the numbering stamps, announced by the Numberall Stamp & Tool Co., Huguenot Park, Staten Island, N. Y., have wheels made of hardened tool steel. The stamp is held up by springs, and when ready for stamping the shank is pressed down by hand until it touches the work. A light hammer blow will then give a good impression.

For stamping large objects, the stamp can be taken out of the holder. The holding arm works on a hinge and can be lifted to facilitate changing the numbers. Platform is furnished with adjustable guide and setscrew, enabling the operator to locate the plates or tags with precision and speed. Setscrew regulates for depth of stamping. Serial letter wheels can be furnished.





Stanley Portable "Unishear"

Similar in appearance to the 18-gage "Mighty Midget," the No. 16 "Unishear" brought out by the Stanley Electric Tool Division of the Stanley Works, New Britain, Conn., has almost twice as much power and is of heavier construction. It is designed primarily for shops doing continuous production work on tough sheet materials or for job shops that cut up to 16-gage hot-rolled steel.

The Unishear cuts straight lines, curves, angles and notches without burr or distortion. Inside cuts are easily made after punching a 2-in. hole for the yoke. Circles or curves with a radius as small as 1½ in. may be cut. Rate of feed is up to 15 ft. per min. The unit weighs 10¼ lb. and is 13½ in. long; it has a pivoted duplex handle.

Du Pont Bright Zinc

An electro-plating process, which deposits a bright zinc surface on steel articles is announced by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. This process was developed to meet the need for an economical method of making steel rust-proof while, at the same time, giving it a bright appearance.

The Round Table

PURCHASED PARTS

"What's the worry, Al? You look as though you had the cares of the nation on your shoulders."

"Not the nation, Ed. Just a few uneasy stockholders like yourself."

"I haven't been grumbling lately. Orders are coming in so well everything looks good to me."

"That's the trouble, Ed. We've got a lot of orders, and too darn many of them want quick deliveries."

"We'll have to enlarge the shop a bit then. There's nothing like healthy expansion, Al."

"Expansion can be mighty unhealthy, Ed. That's what I'm worried about. More floor space and more machine equipment are fine when you need them. But if orders fall off, or we get cancellations because of slow delivery, they can be an awful headache."

"But what else can we do, Al? We can't turn down the orders we've been hoping for ever since we started."

"What about money for one thing, Ed. It takes money to rent more space, or to build an addition, or to buy machine tools."

"Gosh, Al, you're a pessimist. Haven't the banks loosened up on loans? You told me about that yourself not so long ago."

"They have, Ed. But that isn't all of it. The machine tool men are so busy we'd have to wait for delivery of new machines. And the good used tools have already been picked up. But even if we could get the money and the tools, I'd still hesitate to obligate ourselves."

"So we'll just sit still and let the orders slide, I suppose."

"Not as bad as that, Ed. I'm wondering if we can't farm out some of the work to shops in town that are not busy. Some of them have the right equipment and can do the work O.K."

"Sounds foolish to me, Al. I believe in making all our own stuff—then we know it's right. Or if it isn't we know who's to blame. No really good company farms out part of its work. They do it all right under their eyes and know that they are safe."

"You're wrong again, Ed. Did you ever hear of the automobile industry? How much of that old crate that you drive do you suppose was made in the motor plant? Did you ever hear of the motor parts industry? Starting at the radiator and ending up at the rear axle, I can name dozens of parts made outside the motor plant."

"But that's different, Al. Parts makers are specialists. What do the shops in this town know about compressors?"

"The shops I have in mind can handle our work and they can employ men who are now idle to run their idle machines. It will be better for the town, and you won't get heart failure from spending a lot of money to enlarge this plant."

"But how do you know the parts will fit, Al?"

"Inspection, Ed."

Would Al be wise to farm out part of his work? Or should he enlarge the plant, as Ed suggests?

DISCUSSION

Fine Feathers

Of two machines at or about the same price, the one combining some elegance of appearance along with usefulness will be accepted. Just as workers will produce better results under favorable and hygenic conditions, so better results can generally be secured from machinery in which everything has not been sacrificed to mere utility. The machine itself may not function better, but in the majority of cases the operator will.

It should not be overlooked that extra cost to impart some measure of distinctiveness in appearance is often almost negligible. As a selling point, however, that extra is not insignificant.

The zest for the spick and span engine room, the well-swabbed deck, and the car with an air of distinction is not the foible of the few. It is a part of life, at least in so far as many of the most responsible men are concerned, and the engineer is no exception to the rule. —W. R. NEEDHAM, *Stafford, England.*

Appearances always count for something, but just how much depends upon the judgment or lack of judgment of the purchaser.

The proportion of total productive labor cost that should be allocated for finishing a machine to give it a pleasing appearance cannot be stated in definite terms, as each case must be considered from the point of view of the use to which the machine is to be put

and the treatment it is likely to get in everyday use. Those who are in daily touch with average machine shop conditions will agree that machine tools and equipment get the sort of treatment their appearance seems to indicate they can stand.

Finish, however, stands for something more than paint, polish, or highly frosted surfaces. While such finishes have not been omitted in many cases, edges that should be rounded left sharp; dowels not finished off; screws with damaged slots; and outlines of covers not blended with their mating faces are but a few of the more noticeable points in lack of finish in many machines. This visible evidence of lack of care in finishing a machine often creates the impression that there may have been a lack of care in the finish of parts that do not appear on the surface, but are of vital importance to the efficiency of the machine.

—W. L. WATERHOUSE,
Bristol, England.

The average purchasing agent usually has but a superficial technical knowledge and does not know the value of efficiency or performance. He usually buys on appearance and show of the machine without judging its performance. Most times he is right and obtains the name of being an astute buyer.

If, however, the maintenance or works engineer has to do the buying, he insists on performance data, as he has to keep running costs down. On the whole, however, he will give his vote in favor of the machine that is well finished, as he naturally thinks that the parts he cannot see are up to the same high standard of finish as are the visible ones. In the end, both the purchasing agent and the works engineer will decide on the same machine, though through different channels of thought.

Good finish should help to sell machines because a slipshod finish gives the impression that the vital parts are also finished in a slipshod manner.

—D. MACLAREN CATHCART,
Erdington, Birmingham, England.

Tap Testing

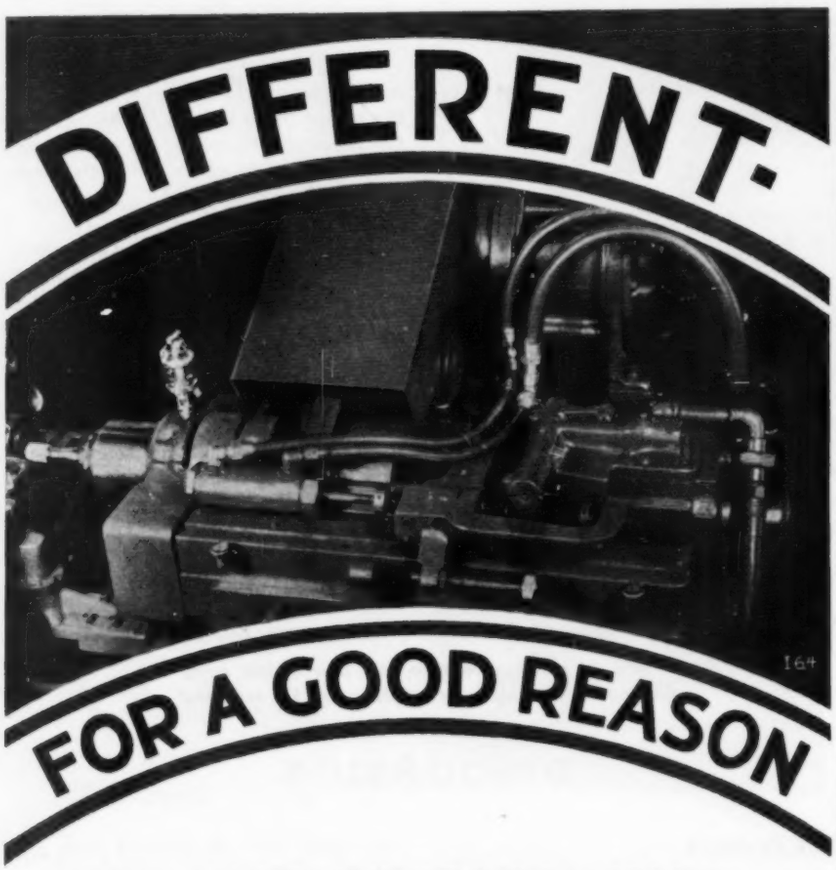
Al's process of thought in testing taps seems to be a labor of love wasted. Today, with ground taps and the methods of making and inspecting screws, there is no reason why time should be wasted by any user in testing either taps or screws purchased from reputable manufacturers.

The accuracy of hand-tapped holes is in line with the general run of hand work. It depends upon the man doing the tapping and not, as some would tell us, on the extreme accuracy of the tap, where the standard tap gives as good accuracy as does the ground tap.

For some years engineering societies have been designating standards for tapped holes that one may, should, or might adhere to if such accuracy is considered necessary for the particular job at hand.

But now comes a maker of tapping machines who tells us that speed is nothing; that the drilled hole has but little effect on either the accuracy or the size of the tapped hole; that the one thing needed is the proper lubricant to use on the tap. This maker of tapping machines says he will demonstrate to anyone who will visit his plant that, using any make of ground tap, he can give any type of fit desired in tapped holes, from the sloppy hand-tapped hole to an accuracy of 0.0002 in., by simply varying the quality of the lubricant.

—C. G. WILLIAMS.



The new Landis Type C 15"x8" Hydraulic Internal Grinder is hard at work turning out shallow bores by the thousands. Tirelessly, the short rapid reciprocating strokes continue hour after hour. But notice that the grinding wheel fixture only—not the entire wheel base—is reciprocating.

Therein lies the difference referred to. The wheel base is massive, well proportioned, but firmly attached to the bed. Rigidly supported by it is the hydraulically reciprocated grinding wheel fixture. Being relatively light, the reciprocating fixture is much less likely to set up vibration during the short rapid reciprocating strokes. A superior finish results.

You will be interested in the greater detail of catalog E-35. 194

LANDIS TOOL CO.
WAYNESBORO, PA.

NEW BOOKS

"WHAT ABOUT DIRECT LOANS TO INDUSTRY?"—*No. 5 of a series of studies dealing with current national questions of business interest as instituted by the Associated Business Papers, Inc. and the National Conference of Business Paper Editors. 34, 8½x11-in. pages. Available from the Associated Business Papers, Inc., 330 West 42nd Street, New York, N. Y. Price, 50 cents.*

This study analyzes the record of the Reconstruction Finance Corporation, of the Federal Reserve System banks, and of the Federal Housing Administration. It points out that to date only a fraction of the funds intended for use by business has been released. Furthermore it points out that railroads, insurance companies, banks and farmers have realized a far greater benefit through Federal financing than has private business.

Hesitancy to apply for loans can be traced to fear of red tape, reluctance to borrow, lack of knowledge, fear of possible Government interference in management, animosity toward Government measures to finance business and unwillingness to expand operations in the face of an uncertain future.

Many constructive recommendations are made. These suggest better education of the banking fraternity and of business men as to the availability of funds, and the means by which they may be obtained, a plea for faster action in handling applications, a suggestion that the loan agencies might assume part of the cost involved in putting loan applications in shape, and an urgent request that small business should receive relatively greater consideration than it has had to date.

FINISHING METAL PRODUCTS—*By Herbert R. Simonds, General Manager, Metal Products Exhibits, Inc. 337 pages, 6x9 in., Cloth-board binding. Indexed and illustrated. Published by the McGraw-Hill Book Company, 330 West 42nd St., New York, N. Y. Price $3.50.*

There is no question that manufacturers of metal products have become finish conscious. They have proved to their own satisfaction that money expended for improving appearance and protecting the surface returns in increased acceptance of their output.

Mr. Simonds does more than describe new developments in metal finishing. He tells of the commercial value of appearance, the importance of color and the problem of selecting the right process for a particular product.

These broad considerations are backed by a well balanced discussion of results obtainable and methods for securing them. The preparation of metallic surfaces for subsequent finishing operations is shown to be a means for saving rather than an expense in many instances. Polishing, buffing, painting, spray coating, plating, enameling and some of the more specialized processes receive their due share of the author's attention.

Manufacturers, perforce, must give greater attention to finishing. And when they spend $450,000,000 for polishing alone and $20,000,000 a year for lacquering in a single industry it is essential that they give this phase of manufacture as critical an analysis as other production operations.

The magnetic surface of the Taft-Peirce 408 Precision Duplex Chuck swivels to 90° either side of horizontal—tilts to any angle from 0 to 14°

This new Taft-Peirce Superpower eliminates the difficult set-ups for grinding plain or compound angles on form tools and other work.

Set your angles on two precision-graduated scales, locate the piece, throw the switch *and grind*. No special fixtures—no complicated set-ups—yet you get greater accuracy.

The Taft-Peirce Precision Duplex Chuck is a true precision fixture built to gage accuracy and finish. If you grind angles and want to grind them faster, to closer limits, write for specifications and prices.

TAKE IT TO TAFT-PEIRCE

1937

meeting MACHINING REQUIREMENTS uniformly

GOOD WILL BASED ON GOOD STEEL

It is one thing to produce a single heat of steel that will meet some definite machining requirement satisfactorily—but another thing to maintain this machining quality steadily from heat to heat. Uniformity is one of the most valuable advantages of Timken Alloy Steel. It is the result of scientific regulation and control of every manufacturing process combined with a rigid system of supervision and testing that leaves nothing to chance.

THE TIMKEN STEEL & TUBE COMPANY, CANTON, OHIO

District Offices or Representation in the following cities:

Detroit Chicago New York Los Angeles Boston
Philadelphia Houston Buffalo Rochester Syracuse
Tulsa Cleveland Erie Dallas Kansas City
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TIMKEN ALLOY STEELS

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